

ASTRONOMISCHE NACHRICHTEN.

N^o 2977-78.

Catalogue of 94 New Double Stars

discovered with the 18½ inch Refractor of the Dearborn Observatory, Evanston, Ill., U. S. A.

and

Measures of 107 Double Stars.

By Prof. G. W. Hough, Director.

Introduction.

The double star observations which follow, comprise 94 new pairs, together with measures of 107 pairs already catalogued. With the exception of well known pairs and binaries, the great majority of the pairs measured were picked up and measured for new ones. Subsequently, through the kindness of Mr. S. W. Burnham, my list was compared with his general Catalogue (Manuscript) and the known pairs identified.

All the measures prior to 1889 were made at the old site of the Dearborn Observatory in the City of Chicago.

In the month of November 1887 the Instruments were dismantled and the old site abandoned.

The 18½ inch Refractor, was again remounted, in the month of August 1889 on the new site at Northwestern University, Evanston, Illinois, U. S. A.

The new Observatory building is the gift of James B. Hobbs Esqu. and was erected at a cost of seventy-five thousand dollars; it is a first-class structure in every respect.

The Equatorial room is 34 feet in diameter, in the clear on the inside. The dome is of iron, with a continuous opening 4 ft. in width, extending from the horizon to two feet beyond the zenith. The shutter, for covering the opening, extends over the whole hemisphere, somewhat similar to that of the Greenwich dome; being pivoted on one side, and resting on a truck on the opposite side.

The shutter may be opened or closed in less than ten seconds, requiring for this purpose a force of ten pounds applied to an endless rope.

The moving parts of the dome weigh ten tons; it may be turned, by one person, through a complete revolution in one minute. The direct force, applied at the circumference of the dome, necessary to revolve it, varies between 15 and 30 pounds, depending on the temperature. In very cold weather the friction is greater than in warm weather. The new site is more favorably situated for astronomical work than the old location in Chicago; being entirely free from smoke.

In the new Observatory, the ease with which the

shutter and dome may be manipulated, greatly increases the possibilities for observation.

The method of observation for double stars has been fully described in our first Catalogue of double stars, *Astr. Nachr.* Band 116, Nr. 2778-79.

The second Catalogue contains 94 new pairs, which, with a few exceptions, are difficult objects, requiring good atmospheric conditions for their measurement with the 18½ inch refractor.

The following is a synopsis according to distance.

Distance	Stars
0" to 0".5	23
0.5 » 1	12
1 » 2	14
2 » 5	19
Over 5	26

The pairs having a greater distance than 5" are excessively unequal in magnitude.

My Catalogue now contains 48 pairs having a distance less than 0".5, a larger number of very close pairs, than is found in the great Catalogues, of either Otto Struve or S. W. Burnham.

A large percentage of these close pairs ought to prove to be binaries.

In the table of observations, the 1st column is the date; 2^d angle of position; 3^d distance; 4th and 5th magnitudes; 6th eye-piece.

The powers of the eye-pieces are as follows: I 190, II 292, III 390, IV 638, V 925.

The sign ± indicates an estimation. In the case of very close pairs, however, it indicates an approximate value; the object being too difficult to obtain a measure of precision.

In pairs which I have been unable to separate, I have frequently omitted the measure of distance, because such measures can have no real value. The thickness of the micrometer wires is 0".32, and until the wires are separated sufficiently to see light between them, one may turn the micrometer screw back and forth, and get almost any result desired.

The position of pairs not identified in a star Catalogue,

has been obtained by rough differential measures from a known star near. In addition to the Catalogue place, of a close or otherwise difficult double. I have indicated its position with reference to another star, so that it may be found without very accurate pointing of the telescope.

Abbreviations used in the Catalogue and measures.

W.	denotes	Weisse.
DM.	»	Durchmusterung.
SD.	»	Südliche Durchmusterung.
Lal.	»	Lalande.
AG. Leiden	»	Leiden Annalen, vierter Band.
Schj.	»	Schjellerup.
Quet.	»	Quetelet, Catalogue de 10792 Étoiles.
Glasg.	»	Glasgow Catalogue of 6415 stars.

Yar.	denotes	Yarnall Catalogue of stars.
Val.	»	Karlsruhe Beobachtungen, zweites Heft.
Port.	»	Cinc., J. G. Porter, Cat. of 4050 stars.
Σ	»	W. Struve.
$O\Sigma$	»	Otto Struve.
Δ	»	Baron Dembowski.
β	»	S. W. Burnham.
P.	»	Perrotin.
H.	»	Herschel.
A.C.	»	Alvan Clark.
A.G.C.	»	Alvan G. Clark.
S.	»	Secchi.
D.	»	Dawes.
Cin.	»	Stone and Cincinnati Observers.
L.	»	F. P. Leavenworth.
Ho.	»	G. W. Hough.

Catalogue of 94 New Double Stars. (Right-Ascension and Declination for 1880.)

Ho. 210. W_2 0^h45^o.
RA. 0^h19^m17^s Decl. +35° 49'.

1886.887	65.3	0.69	8	10	V
87.782	75.0	1.04	8	9.5	»
1887.33	70.1	0.86	8	9.7	

8.5 mag. star N 15' and same RA.

Ho. 211. W_2 0^h64^l.
RA. 0^h26^m28^s Decl. +35° 12'.

1887.829	15.3	1.31	7.5	12	V
90.006	16.0	1.40	8	12	III
1888.92	15.6	1.35	7.7	12	

Ho. 212. 13 Ceti. AC = β 49^o.
RA. 0^h29^m3^s Decl. -4° 15'.

A and B.

1886.829	80 ±	0.3 ±	6	6	V
87.815	93.4	0.3 ±	6	6	»

A and C.

1887.815	60.8	35.63	—	13	
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A very close pair.

Ho. 213. DM. +34° 17^l.
RA. 0^h57^m21^s Decl. +34° 49'.

1886.933	193.9	0.2 ±	7	7	V
87.815	197.4	0.3 ±	7	7	»
1887.37	195.6	0.25 ±	7	7	

Too close to measure distance.
7 mag. star follows 2^m 8^s and 3' N.
8 mag. star follows 2^m 46^s and 7' N.

Ho. 214. Lal. 2027.
RA. 1^h3^m0^s Decl. +37° 29'.

1886.933	246.9	2.85	8	12	III
87.782	245.8	2.85	8	12	»
1887.36	246.3	2.85	8	12	

The magnitude of this star is given as follows:
Lal. 7^m, Yarnall 6^m5, DM. 7^m5.

Ho. 215. 45 Andromedae.
RA. 1^h4^m26^s Decl. +37° 5'.

1886.887	280 ±	0.4 ±	6	6	V
87.782	not seen double				»
89.966	259.1	elong.	—	—	»

A close and very difficult pair.

Ho. 216. AG. Leiden Z. 8.59.
RA. 2^h19^m55^s Decl. +30° 45'.

1886.971	334.4	0.94	8	10	V
87.039	328.4	1.03	8	11	III
1887.00	331.4	0.98	8	10.5	

A rather difficult pair.
6 mag. star N 30' and following 28^s.

Ho. 217. W_2 2^h98^l.
RA. 2^h42^m0^s Decl. +34° 1'.

1886.971	276.7	2.12	8.5	10.5	III
87.039	275.3	1.93	8.5	11	»
1887.00	276.0	2.02	8.5	10.7	

β 523 S 32' and following 3^s.

Ho. 218. W_1 2^h75^l.
RA. 2^h45^m7^s Decl. +2° 34'.

1886.879	s	0.5 ±	7	7	III
89.942	210 ±	0.4 ±	7	7	V
90.046	215 ±	elong.	—	—	»

Ho. 219. W_2 2^h120^l.
RA. 2^h51^m57^s Decl. +37° 24'.

1889.977	243.0	6.26	8.2	12.5	III
90.077	244.7	6.36	8	12	»
1890.03	243.8	6.31	8.1	12.2	

7 mag. star N 15' and follows 39^s.

Ho. 220. Schj. 1224.

RA. $3^h 50^m 29^s$ Decl. $-11^\circ 1'$.

1889.950	sf	$2.5 \pm$	8	11	III
90.120	110.3	1.72	8	11	»
90.137	112.4	1.36	8	11	»
1890.13	111.3	1.54	8	11	

7 mag. star S $8'$ and following 19° .Ho. 221. DM. $+54^\circ 734$.RA. $3^h 55^m 11^s$ Decl. $+54^\circ 45'$.

1886.991	f	$4 \pm$	7	12	III
87.107	96.7	5.09	7	12.5	»
89.977	94.5	4.19	7	11	»
1888.54	95.6	4.64	7	11.7	

Ho. 222. $W_2 4^h 11 33$.RA. $4^h 51^m 53^s$ Decl. $+31^\circ 24'$.

1886.971	221.8	1.94	8	11	III
87.074	223.5	1.85	7.5	10	»
1887.02	222.6	1.89	7.7	10.5	

Ho. 17 is S $35'$ and precedes 13° .Ho. 223. $W_2 4^h 12 73$.RA. $4^h 57^m 48^s$ Decl. $+35^\circ 41'$.

1886.971	nf	$2 \pm$	8	12	III
89.977	42.4	1.39	8	12	»
90.120	41.7	1.49	8	12	»
1890.05	42.0	1.44	8	12	

7 mag. star N $5'$ and foll. 12° .Ho. 224. DM. $+28^\circ 741$.RA. $4^h 57^m 10^s$ Decl. $+28^\circ 33'$.

1886.971	277.3	1.51	9	10.5	III
87.074	279.2	2.14	9	11	»
1887.02	278.2	1.82	9	10.7	

There is a 11 mag. star P = 318° and $40''$ distance.
7 mag. star N $3'$ and same RA.

Ho. 225. Quet. 2068.

RA. $5^h 14^m 56^s$ Decl. $+12^\circ 33'$.

1887.125	118.0	0.37	8	8	V
90.104	105.0	0.35	8	8.2	»
1888.61	111.5	0.36	8	8.1	

This pair will probably prove to be binary.
8 mag. star N $6'$ and following 2^m .Ho. 226. $W_2 5^h 50 7$.RA. $5^h 19^m 28^s$ Decl. $+27^\circ 30'$.

1887.104	225.5	$0.4 \pm$	7	7	III
87.181	234.9	0.50	7	7	»
1887.14	230.2	0.50	7	7	

Distance measured too great.

6.5 mag. star S $10'$ and follows $56'$ of arc.Ho. 227. DM. $+11^\circ 971$.RA. $5^h 49^m 21^s$ Decl. $+11^\circ 30'$.

1886.203	$260^\circ \pm$	$2'' \pm$	8	13	II
90.104	241.3	2.08	8	12.5	III

6 mag. star follows 46° and same decl.Ho. 228. $W_1 5^h 14 77$.RA. $5^h 59^m 17^s$ Decl. $+12^\circ 29'$.

1886.109	p	$2 \pm$	8	11	III
87.074	262.4	1.91	8	11	»
87.104	267.5	1.71	8	11	»

1887.09 | 264.9 | 1.81 | 8 | 11 |

8.5 mag. star N $12'$ and preceding 22° .Ho. 229. $W_1 6^h 27 2$.RA. $6^h 11^m 16^s$ Decl. $+14^\circ 26'$.

1886.109	n	$3 \pm$	6	13	III
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A difficult pair owing to the closeness and inequality of the components.

Ho. 230. $W_1 6^h 29 6$.RA. $6^h 12^m 6^s$ Decl. $+13^\circ 49'$.

1886.109	f	$1.5 \pm$	8	11	III
87.074	52.0	1.20	8.3	10.5	»

8.5 mag. star follows 30° and same decl.Ho. 231. $W_1 6^h 36 2$.RA. $6^h 13^m 45^s$ Decl. $-12^\circ 28'$.

1887.125	nf	$6 \pm$	8	11	III
87.236	49.0	6.81	8	11	»

 β 18 N $25'$ and preceding $2^m 32^\circ$.

Ho. 232.

RA. $6^h 14^m 55^s$ Decl. $+14^\circ 44'$.

1887.074	n	$2 \pm$	9.5	11	III
90.109	343.7	2.03	9.5	11	V

7 mag. star precedes 45° and $2'$ N.Ho. 233. DM. $+16^\circ 1118$.RA. $6^h 16^m 13^s$ Decl. $+16^\circ 35'$.

1886.109	nf	$2 \pm$	8	11	III
87.074	36.3	1.70	8.3	11	»
87.104	38.0	1.64	8.2	11	»
1887.09	37.1	1.67	8.2	11	

Ho. 234. SD. $-11^\circ 1536$.RA. $6^h 28^m 55^s$ Decl. $-11^\circ 8'$.

1887.118	$180 \pm$	$0.4 \pm$	8.5	8.5	III
87.181	$171.5 \pm$	$0.4 \pm$	8	8	»
87.217	187.2	0.37	8.2	8.2	V
90.071	184.1	0.37	8.2	8.2	»
1888.64	185.6	0.37	8.2	8.2	

A close and difficult pair.

7 mag. star N $3'$ and preceding $1^m 45^\circ$.

There are two distant companions 9 mag. star preceding and 11 mag. star following.

Ho. 235.

RA. $6^h 28^m 56^s$ Decl. $-11^\circ 10'$.

1887.181	f	$3'' \pm$	10.5	11	III
90.071	54.7	2.99	10.5	11	»
90.099	55.0	2.72	10.5	11	»
1890.08	54.8	2.85	10.5	11	

In the field South with the preceding pair.

Ho. 236. $W_2 6^h 981$.RA. $6^h 33^m 55^s$ Decl. $+20^\circ 45'$.

1890.104	201.7	17.68	7.5	13	III
90.109	203.4	17.00	7	13	»
1890.11	202.5	17.34	7.2	13	

Ho. 237. Schj. 2327.

RA. $6^h 35^m 47^s$ Decl. $+3^\circ 22'$.

1887.074	$142 \pm$	$0.3 \pm$	7.5	7.5	III
87.211	$153 \pm$	$0.3 \pm$	7.5	7.5	V

Too difficult to measure well.

There is a 10 mag. star in the field following $P = 53^\circ$, distance $2' \pm$.7 mag. star S $13'$ and following $1^m 3^s$.Ho. 238. $W_2 6^h 1169$.RA. $6^h 39^m 20^s$ Decl. $+18^\circ 20'$.

1886.167	$180 \pm$	$0.5 \pm$	8	8	III
87.211	185.8	0.45	8.5	8.5	V

A close pair.

 $O\Sigma 156$ follows 1^m and same decl.Ho. 239. $W_1 6^h 1267$.RA. $6^h 43^m 8^s$ Decl. $+14^\circ 50'$.

A and B.

1886.145	$130 \pm$	$0.5 \pm$	8.5	8.5	III
87.211	132.9	0.36	8	8.5	V

A and C.

1887.104	336.4	36.10	—	11	III
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A very close pair.

8 mag. star S $6'$ and preceding $1^m 41^s$.

Ho. 240. Quet. 2851.

RA. $6^h 47^m 46^s$ Decl. $+21^\circ 43'$.

1887.208	s	$20 \pm$	7	12	III
90.104	172.4	19.62	7.3	12	»

Ho. 241. DM. $+4^\circ 1567$.RA. $6^h 58^m 2^s$ Decl. $+4^\circ 45'$.

1887.211	s	$8 \pm$	8	13	III
87.241	182.7	8.82	8	13	I

Rather difficult owing to the faintness of the companion.

7 mag. star N $10'$ and preceding $2^m 42^s$.Ho. 242. $W_1 7^h 393$.RA. $7^h 14^m 20^s$ Decl. $-4^\circ 46'$.

1886.170	nf	$5'' \pm$	7	11	III
87.104	64.6	4.22	7	12	»
87.178	64.0	4.20	7	12	»
1887.14	64.3	4.21	7	12	

8 mag. star N $2'$ and following 19^s .Ho. 243. DM. $+29^\circ 1517$.RA. $7^h 15^m 4^s$ Decl. $+29^\circ 29'$.

1883.323	166.8	1.89	9.3	9.5	III
87.178	165.5	1.69	9.3	9.5	»
1885.25	166.1	1.79	9.3	9.5	

 $\beta 1024$ in the field N $3'$ and following 33^s .Ho. 244. DM. $-1^\circ 1779$.RA. $7^h 31^m 25^s$ Decl. $-1^\circ 46'$.

1887.211	199.1	11.85	7	13	III
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There are two distant companions:

13 mag. star P = 195° , distance $34''$ 9 mag. star P = 109° , distance $69''$.Ho. 245. $W_1 7^h 967$.RA. $7^h 32^m 38^s$ Decl. $-1^\circ 11'$.

1887.175	$170 \pm$	$0.4 \pm$	7	7	III
87.203	174.9	$0.3 \pm$	8	8	V
87.211	179.2	0.34	8	8	»
87.225	181.0	0.42	8	8	»
1887.21	178.4	0.38	8	8	

A very close pair.

There are two distant companions:

9 mag. star P = 98° , distance $50'' \pm$ 9 mag. star P = 155° , distance $60'' \pm$.Ho. 246. $W_3 7^h 1076$.RA. $7^h 38^m 12^s$ Decl. $+26^\circ 17'$.

1887.296	223.6	2.48	7.5	12	III
87.299	221.5	2.21	7.5	13	»
1887.30	222.5	2.34	7.5	12.5	

6.5 mag. star S $12'$ and preceding $1^m 24^s$.Ho. 247. DM. $+21^\circ 1679$.RA. $7^h 39^m 3^s$ Decl. $+21^\circ 25'$.

1887.203	102.3	0.29	7.5	8	V
87.236	100.3	0.43	7.5	8	»
1887.22	101.3	0.36	7.5	8	

A very close and difficult pair.

8 mag. star S $4'$ and follows $1^m 50^s$.Ho. 248. DM. $+21^\circ 1702$.RA. $7^h 44^m 35^s$ Decl. $+21^\circ 22'$.

1887.203	$96 \pm$	$18 \pm$	9	12	III
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7 mag. star follows $35'$ arc and $1' N$.

Ho. 249. W_2 7^h1331.

RA. 7^h48^m3^s Decl. +21° 59'.

1887.203	205.2	2.92	8	13	III
87.225	203.4	2.88	8	13	»
1887.21	204.3	2.90	8	13	

A very difficult pair owing to the faintness of the companion.

7 mag. star S 30' and precedes 1^m.

Ho. 250. W_2 7^h1371.

RA. 7^h50^m3^s Decl. +21° 17'.

A and B.

1887.074	f	0.3 ±	6.5	8	III
87.203	160 ±	0.6 ±	7	9	V
87.217	160 ±	0.5 ±	7	9	»
87.299	163 ±	0.5 ±	7	9	»
1887.22	161 ±	0.5 ±	7	9	

A and C.

1887.203	154.8	9.42	—	13	
87.217	154.1	9.35	—	13	
1887.21	154.4	9.38	—	13	

The close pair was too difficult to measure with any reasonable degree of precision.

Ho. 251. W_2 8^h953.

RA. 8^h39^m3^s Decl. +25° 45'.

1887.266	151.2	3.81	8.5	12	II
87.293	151.0	3.65	8.5	12.5	III
1887.28	151.1	3.73	8.5	12.2	

8 mag. star N 3' and preceding 5^s.

Ho. 252. AG. Leiden Z. 12.76.

RA. 8^h50^m41^s Decl. +30° 42'.

1887.217	140 ±	0.3 ±	6.5	6.5	V
87.225	146 ±	0.3 ±	6.5	6.5	»
1887.22	143 ±	0.3 ±	6.5	6.5	

A very close pair and too difficult to make a reliable measure.

ι² Cancri 20' N and precedes 3^m5.

Ho. 253. W_1 9^h876.

RA. 9^h41^m21^s Decl. +10° 38'.

1887.239	289.2	1.00	7	12	V
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A difficult pair owing to the closeness and inequality of the components.

7 mag. star N 15' and preceding 3^s.

Ho. 254. AG. Leiden Z. 26.61.

RA. 11^h6^m49^s Decl. +34° 6'.

1887.299	164.3	2.45	6.5	13	III
87.375	165.1	2.17	6.5	12	»
1887.33	164.7	2.31	6.5	12.5	

ν Urs. maj. S 20' and follows 60' arc.

Ho. 255. W_2 11^h1174.

RA. 12^h0^m48^s Decl. +21° 10'.

1886.329	110° ±	2" ±	8	12	II
87.293	131.8	2.37	8.5	12.5	III
87.296	135.0	2.53	8	12	»
1887.29	133.4	2.45	8.2	12.3	

A rather difficult pair.

6 mag. star N 3' and follows 70' arc.

Ho. 256. DM. +36°2305.

RA. 12^h38^m23^s Decl. +36° 26'.

1887.403	101.9	0.5 ±	7	9	V
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A close and difficult pair.

7 mag. star S 6' and following 30^s.

Ho. 257. W_2 12^h1157.

RA. 13^h0^m4^s Decl. +26° 52'.

1886.397	s	1.5 ±	8.5	8.5	II
87.227	154.5	1.78	9	9	III
87.348	156.2	1.83	8.8	9	»
1887.28	155.3	1.80	8.8	8.9	

7 mag. star N 20' and precedes 3^s.

Ho. 258. W_2 13^h294.

RA. 13^h16^m33^s Decl. +36° 16'.

1885.436	sf	10 ±	7	13	IV
87.392	156.2	10 ±	7	14	III

An exceedingly difficult pair owing to the faintness of the companion.

7 mag. star N 15' and following 40^s.

Ho. 259. W_2 13^h296.

RA. 13^h16^m55^s Decl. +26° 45'.

1886.400	p	8 ±	7	13	II
87.348	241.0	9.60	7	13	III
87.400	244.0	9.81	7	13	»
1887.37	242.5	9.70	7	13	

8 mag. star S 6' and precedes 40^s.

Ho. 260. AG. Leiden Z. 24.4.

RA. 13^h18^m0^s Decl. +29° 51'.

1887.323	299.1	0.66	8.5	8.5	V
87.397	298.5	0.59	8.2	8.5	»
1887.36	298.8	0.62	8.3	8.5	

8 mag. star S 8' and preceding 36^s.

Ho. 261. W_1 13^h816.

RA. 13^h49^m11^s Decl. -8° 56'.

1887.299	s	5 ±	7.5	12	III
87.392	182.2	6.57	7.5	12	»

An easy pair.

Ho. 262. Lal. 26310.
RA. $14^h 17^m 30^s$ Decl. $+33^\circ 3'$.

1886.493	277.7	5.80	7	13	II
87.449	275.6	5.28	7	13	III
1886.97	276.6	5.54	7	13	

Ho. 263. Quet. 5938.
RA. $14^h 42^m 19^s$ Decl. $+24^\circ 36'$.

1887.416	s	$1 \pm$	7	10	III
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A difficult pair owing to the closeness and inequality of the components.

Σ 1884 N 15' and following 1^m .

Ho. 264. W_2 15^h329.
RA. $15^h 16^m 23^s$ Decl. $+16^\circ 56'$.

1887.581	318.1	0.91	8	12	V
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There is a 11 mag. star nf $50'' \pm$.

A very difficult pair owing to the closeness and inequality of the components.

Ho. 265. 24 Ophiuchi.
RA. $16^h 49^m 34^s$ Decl. $-22^\circ 57'$.

1887.509	$260 \pm$	$0.4 \pm$	6	6	III
87.562	$241.5 \pm$	$0.3 \pm$	6	6	»
89.630	235.7	elong.	6	6	»

A very difficult pair for our latitude.

Ho. 266. Quet. 6973.
RA. $17^h 17^m 31^s$ Decl. $-21^\circ 20'$.

1887.509	sf	$3 \pm$	6.5	12	III
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7 mag. star S 2' and follows 2^m .

Ho. 267. Schj. 6581.
RA. $18^h 4^m 53^s$ Decl. $-5^\circ 13'$.

1887.698	np	$18 \pm$	6.5	12.5	III
89.725	355.6	15.70	7	13	»

Ho. 268. DM. $+20^\circ 37' 05''$.
RA. $18^h 8^m 50^s$ Decl. $+20^\circ 14'$.

1887.663	s	$1 \pm$	7	11	III
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A very difficult pair owing to the closeness and inequality of the components.

8 mag. star follows $1^m 5$ and same decl.

Ho. 269.
RA. $18^h 11^m 11^s$ Decl. $+20^\circ 12'$.

1887.782	s	$3 \pm$	9	10	III
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8 mag. star precedes 51^s and same decl.

Ho. 270. W_2 18^h1551.
RA. $18^h 51^m 1^s$ Decl. $+41^\circ 27'$.

A and B.

1884.556	sp	$6'' \pm$	6	13	II
87.545	307.3	8.23	6	13	

A and C.

1887.545	38.7	23.23	—	12	
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Ho. 271. Quet. 7814.
RA. $18^h 51^m 4^s$ Decl. $-20^\circ 35'$.

1887.681	332.0	16.92	7	12.5	II
89.725	335.3	15.74	7	13	III
89.731	336.5	16.57	7	13	»
1889.04	333.9	16.41	7	12.8	

A difficult pair.

6 mag. star S 12' and precedes 54^s .

Ho. 272. SD. $-17^\circ 55' 98''$.
RA. $19^h 14^m 46^s$ Decl. $-17^\circ 28'$.

1887.681	38.4	6.41	8	12	III
89.725	38.5	7.08	7	12	»
1888.70	38.4	6.74	7.5	12	

ρ^1 Sagittae 33' S and precedes 7^s .

Ho. 273. SD. $-16^\circ 53' 57''$.
RA. $19^h 27^m 6^s$ Decl. $-16^\circ 32'$.

1887.681	150.6	4.40	8.5	8.5	III
89.725	152.1	3.33	8.5	8.5	»
89.731	151.0	3.15	8.5	8.5	»
1889.04	151.2	3.63	8.5	8.5	

7 mag. red star S 5' and follows 20^s .

Ho. 274. DM. $+16^\circ 39' 04''$.
RA. $19^h 29^m 30^s$ Decl. $+16^\circ 11'$.

1887.657	f	$3 \pm$	8.3	11	III
87.681	72.4	4.07	8.3	11	»

ϵ Sagittae follows $2^m 22^s$ and same decl.

Ho. 275. 51 Aquilae.
RA. $19^h 44^m 11^s$ Decl. $-11^\circ 4'$.

1887.681	116.9	19.03	5	13	III
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A rather difficult pair owing to the faintness of the companion.

Ho. 276. Schj. 7724.
RA. $19^h 53^m 16^s$ Decl. $-10^\circ 16'$.

1887.660	n	$0.3 \pm$	7	7	III
87.711	$320 \pm$	elong.	7	7	V
87.747	172.9	elong.	7	7	»

A very close pair. I think there can be no doubt regarding the duplicity.

Ho. 277. SD. $-8^{\circ}53'30''$.

RA. $20^{\text{h}}15^{\text{m}}14^{\text{s}}$ Decl. $-8^{\circ}8'$.

1887.782	70.5	2.88	8.5	12.5	III
89.720	70.4	2.77	8.2	13	»
1888.75	70.4	2.82	8.3	12.7	

Schj. 7969 precedes 53^{s} and same decl.

Ho. 278. DM. $+39^{\circ}41'86''$.

RA. $20^{\text{h}}21^{\text{m}}45^{\text{s}}$ Decl. $+40^{\circ}0'$.

1886.826	172.9	$0.25 \pm$	7	7	V
89.928	$197 \pm$	—	—	—	III
89.942	$230 \pm$	—	—	—	»

A very close pair. The seeing was too poor, when it was observed in 1889, to make measures.

8 mag. star follows 40^{s} and $3' \text{ S}$.

Ho. 279. SD. $-6^{\circ}55'30''$.

RA. $20^{\text{h}}30^{\text{m}}2^{\text{s}}$ Decl. $-6^{\circ}15'$.

1887.698	170.8	7.08	9	11	III
89.725	172.7	6.23	9	11	»
1888.71	171.7	6.65	9	11	

7 mag. star precedes $1^{\text{m}}51^{\text{s}}$ and same decl.

Ho. 280. Glasg. 5261.

RA. $20^{\text{h}}43^{\text{m}}14^{\text{s}}$ Decl. $+45^{\circ}8'$.

1887.714	75.2	$13 \pm$	7	13	V
89.942	75.6	14.02	7	13	III
1888.83	75.4	14.02	7	13	

A difficult pair.

8 mag. star S $5'$ and following $1^{\text{m}}1^{\text{s}}$.

Ho. 281. DM. $+23^{\circ}42'24''$.

RA. $20^{\text{h}}58^{\text{m}}10^{\text{s}}$ Decl. $+23^{\circ}31'$.

1887.840	np	$10 \pm$	7	13	IV
89.928	298.8	13.08	7	13	III

8 mag. star N $20'$ and preceding 15^{s} .

Ho. 282. Quet. 9244.

RA. $20^{\text{h}}58^{\text{m}}35^{\text{s}}$ Decl. $+45^{\circ}23'$.

1887.709	5.2	$0.3 \pm$	7	7	V
89.942	6.4	$0.3 \pm$	7	7	»
1888.82	5.8	$0.3 \pm$	7	7	

A close pair.

8 mag. star N $2'$ and preceding 12^{s} .

$O\Sigma$ 426 is N $20'$ and preceding $1^{\text{m}}5$.

Ho. 283. Lal. 41155.

RA. $21^{\text{h}}6^{\text{m}}14^{\text{s}}$ Decl. $+35^{\circ}49'$.

A and B.

1884.753	$178 \pm$	$0.8 \pm$	6.8	12	V
87.753	close pair not seen				III

A and C.

1887.753 | $210^{\circ}6'$ | $22^{\circ}18'$ | — | 12.5 | III

There are two 12 mag. stars North at $40''$ and $60''$ distance.

Ho. 284. DM. $+15^{\circ}43'82''$.

RA. $21^{\text{h}}10^{\text{m}}20^{\text{s}}$ Decl. $+15^{\circ}29'$.

1886.755	86.0	3.77	9	9.5	III
86.777	86.0	3.86	9	9.2	»
1886.77	86.0	3.81	9	9.3	

β (no number) follows 9^{s} and $6' \text{ N}$.

Ho. 285. W_2 $21^{\text{h}}224$.

RA. $21^{\text{h}}10^{\text{m}}45^{\text{s}}$ Decl. $+36^{\circ}45'$.

1887.758	24.2	8.93	7	12	III
89.736	25.6	8.23	7	12.5	»
1888.74	24.9	8.58	7	12.2	

τ Cygni N $46'$ and preceding 45^{s} .

Ho. 286. Var. 9319.

RA. $21^{\text{h}}14^{\text{m}}35^{\text{s}}$ Decl. $+37^{\circ}44'$.

1886.887	$251 \pm$	$0.3 \pm$	6	6	V
87.701	$248 \pm$	$0.3 \pm$	6	6	»

A very close and difficult pair.

Ho. 287.

RA. $21^{\text{h}}18^{\text{m}}8^{\text{s}}$ Decl. $+40^{\circ}0'$.

1886.747	s	$3 \pm$	10	10	II
89.942	189.1	1.59	10	10	III
89.961	189.5	1.63	10	10	V

8 and 8.5 mag. stars North in the field.

Ho. 288. Val.

RA. $21^{\text{h}}27^{\text{m}}51^{\text{s}}$ Decl. $-4^{\circ}54'$.

1887.744	277.9	17.02	6.5	13	III
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A very difficult pair.

5 mag. star N $20'$ and following $1^{\text{m}}13^{\text{s}}$.

Ho. 289. DM. $+26^{\circ}43'65''$.

RA. $22^{\text{h}}6^{\text{m}}4^{\text{s}}$ Decl. $+26^{\circ}40'$.

A and BC.

1887.717	347.2	61.12	7	11	III
87.793	346.8	61.11	7.5	11	»
1887.75	347.0	61.11	7.2	11	

B and C.

1887.793	321.4	3.03	11	11.5	III
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There is a 13 mag. star $P = 270^{\circ} \pm$, dist $10'' \pm$.

Ho. 290. AC = β 436.

RA. $22^{\text{h}}6^{\text{m}}44^{\text{s}}$ Decl. $+57^{\circ}21'$.

A and B.

1885.791	s	$0.6 \pm$	8	11	V
86.750	s	$0.7 \pm$	8	11	»
89.966	208.5	0.53	7.5	11	»

A and C.

1889.966	327.8	19.31	—	12.5	III
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A and D.

1885.807	99±	20±	—	13	III
89.966	100.5	19.36	—	13	»

The close pair is a very difficult object.

Ho. 291. Lal. 43403.

RA. 22^h8^m10^s Decl. +48° 47'.

1886.826	197.5	9.51	7.5	13	III
89.966	198.0	8.72	7	12.5	»
1888.39	197.7	9.11	7.2	12.7	

Ho. 292. W₁ 22^h316.RA. 22^h17^m13^s Decl. +5° 3'.

1887.772	61.4	3.52	8	12	III
87.840	60.9	3.70	8	11	»
1887.80	61.1	3.61	8	11.5	

H. 962 precedes 2^m48^s and 8' N.Ho. 293. W₂ 22^h584.RA. 22^h27^m47^s Decl. +33° 20'.

1886.887	347.7	1.57	8	12	III
87.785	350.9	1.21	8.5	12	V
1887.33	349.3	1.39	8.2	12	

A very difficult pair.

7.5 mag. star S 5' and preceding 44^s.Ho. 294. W₂ 22^h694.RA. 22^h31^m56^s Decl. +26° 49'.

1889.840	53.5	1.81	8	10	III
89.843	55.5	1.83	8	10	»
1889.84	54.5	1.82	8	10	

Ho. 186 N 15' and precedes 55^s.

Ho. 295. Lal. 44318.

RA. 22^h33^m29^s Decl. +43° 41'.

1886.887	336.3	0.25±	7	7	V
87.706	316.6	0.25±	7	7	»
1887.30	326.4	0.25±	7	7	

A very close pair.

5 mag. star S 3' and following 1^m45^s.

Ho. 296. Quet. 10164.

RA. 22^h34^m56^s Decl. +13° 55'.

1887.802	45±	0.6±	5.5	5.5	V
89.893	227±	0.4±	5.5	5.5	»

A difficult pair. Seeing too poor for measures at the last observation.

Ho. 297.

RA. 22^h42^m7^s Decl. +26° 14'.

1882.725	140.5	6.53	9.5	10	II
84.884	141.7	6.88	9.5	10	»
1883.80	141.1	6.70	9.5	10	

Ho. 298. Yar. 10052.

RA. 22^h46^m19^s Decl. +39° 5'.

1886.887	180.8	1"±	8	12	V
87.829	356.4	0.92	8	11	»
89.966	187.6	0.48	8	11	»
1888.23	181.6	0.70	8	11.3	

A very difficult pair. Probably an error of 180° at second observation.

8 mag. star S 2' and preceding 1^m45^s.Ho. 299. W₂ 23^h116.RA. 23^h8^m6^s Decl. +23° 35'.

1887.758	79.3	0.83	8	10.5	V
87.782	72.8	0.92	8	10	»
1887.77	76.0	0.87	8	10.2	

The North star of a small triangle.

Ho. 300. 66 Pegasi.

RA. 23^h17^m1^s Decl. +11° 39'.

1886.900	p	0.4±	5	5	III
87.706	308±	0.3±	5	5	V
89.854	312.1	elong.	5	5	»

Too difficult for reliable measures.

Ho. 301. W₁ 23^h342.RA. 23^h18^m22^s Decl. +13° 49'.

1887.785	11.0	1.44	7	11	V
87.796	5.6	1.19	7.5	11	III
1887.79	8.3	1.31	7.2	11	

A difficult pair owing to the closeness and inequality of the components.

There is a 10 mag. star P = 107°, distance 60"±.

Ho. 302. W₂ 23^h720.RA. 23^h34^m13^s Decl. +19° 5'.

A and B.

1886.900	29±	60±	8	8.5	III
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B and C.

1886.969	75.2	8.46	8.5	12	III
87.788	77.0	8.11	8.5	12	»
1887.37	76.1	8.28	8.5	12	

Ho. 303. W₂ 23^h737.RA. 23^h34^m45^s Decl. +19° 42'.

1887.785	186.8	1.27	8	11	III
89.966	181.8	0.58	8	11	V
1888.87	184.3	0.92	8	11	

A difficult pair.

OΣ 503 follows 1^m13^s and 3' South.

Measures of Double Stars.

β 260.

RA. $1^h 46^m 45^s$ Decl. $+14^\circ 51'$.

1884.917	53.8	0.66	8	8	IV
85.017	47.4	0.62	8	8	V
1884.97	50.6	0.64			
1875.81	228.0	0.57	Δ 3 n.		

β 306.

RA. $2^h 36^m 52^s$ Decl. $+25^\circ 8'$.

1881.772	19.7	3.17	6.5	11	III
81.793	19.5	3.04	6.5	11	»
1881.78	19.6	3.10			
1876.79	17.3	2.93	Δ 4 n.		

β 262.

RA. $2^h 40^m 33^s$ Decl. $+30^\circ 33'$.

1881.813	68.3	1.30	7	8	III
81.887	68.6	1.39	7	8	V
1881.85	68.4	1.34			
1876.29	65.8	1.57	Δ 6 n.		

$O\Sigma$ 516.

RA. $3^h 41^m 6$ Decl. $+31^\circ 54'$.

1881.887	37.7	2.38	8	10.5	III
81.890	37.2	2.24	8	10.5	»
1881.89	37.4	2.31			

Apparently unchanged.

South 503.

RA. $5^h 49^m 10^s$ Decl. $+13^\circ 56'$.

1886.186	40.4	2.52	7	9	III
86.197	39.7	2.02	—	—	II
1886.19	40.0	2.27			

Rapid change by proper motion.

β 1008. η Geminorum.

RA. $6^h 7^m 38^s$ Decl. $+22^\circ 32'$.

1886.337	284.0	0.92	3	9	V
86.342	288.4	0.82	—	—	»
86.353	295.4	0.92	—	—	»
1886.34	289.3	0.89			
1882.05	301.4	0.96	β 5 n.		
1889.14	294.4	1.04	β 3 n.		

A. G. C. 1. Sirius.

RA. $6^h 39^m 52^s$ Decl. $-16^\circ 33'$.

Mean Results.

1880.17	49.6	9.87	3	nights	
81.26	45.3	9.60	5	»	
82.13	43.1	9.30	9	»	
83.12	39.7	9.02	11	»	
84.18	36.7	8.51	11	»	
85.20	32.7	7.96	10	»	
86.14	28.7	7.21	12	»	
87.19	23.7	6.78	7	»	

Orbit by J. E. Gore: period 58.5 years.

Σ 1291. 57 Cancri.

RA. $8^h 46^m 9$ Decl. $+31^\circ 2'$.

1881.280	333.5	1.47	7	7	III
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Apparently unchanged.

Σ 1424. γ Leonis.

RA. $10^h 13^m 3$ Decl. $+20^\circ 27'$.

1881.307	114.1	4.55	3	4	II
81.312	120.1	4.15	—	—	»
81.315	118.9	4.19	—	—	III
81.331	115.9	3.83	—	—	II
1881.32	117.2	4.18			

$O\Sigma$ 228.

RA. $10^h 40^m 8$ Decl. $+23^\circ 12'$.

1882.427	196.2	0.4 \pm	7.5	7.5	V
83.367	189.9	0.40	—	—	»
1882.90	193.0	0.40			

Probably unchanged.

Σ 1524. ν Urs. Maj.

RA. $11^h 12^m$ Decl. $+33^\circ 45'$.

1882.403	147.8	7.08	3	10	II
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Probably unchanged.

Σ 1536. ι Leonis.

RA. $11^h 17^m 7$ Decl. $+11^\circ 11'$.

1881.416	65.2	2.91	4	8	III
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β 603.

RA. $11^h 42^m 28^s$ Decl. $+14^\circ 57'$.

1882.331	335.4	0.90	6	10	V
1879.25	336.7	1.32	β 4 n.		
1889.271	327.5	1.5	L 1 n.		

H. 1201.

RA. $11^h 44^m 8$ Decl. $+12^\circ 54'$.

1882.364	188.9	14.88	7	12	II
82.425	190.1	14.52	6	12	»
83.411	191.0	14.87	6	12	I
1882.73	190.0	14.76	6.3	12	
1878.24	190.0	14.75	β 1 n.		

H. 842.

RA. $11^h 45^m 4$ Decl. $+45^\circ 29'$.

1882.411	90.5	3.65	8	8.2	II
83.397	88.8	3.40	—	—	»
1882.90	89.6	3.52			

β 27.

RA. $12^h 13^m 59^s$ Decl. $+14^\circ 32'$.

1882.425	110.0	3.32	7	11	III
82.427	108.4	3.35	—	—	»
82.430	109.4	3.15	—	—	»
1882.43	109.3	3.27			
1875.53	106.5	3.39	Δ 4 n.		

H. 2617.

RA. 12 ^h 34 ^m 8 Decl. +40° 58'.					
1883.422	8.1	5.34	7	10	II
83.425	8.3	5.46	8	10	»
1883.42	8.2	5.40	7.5	10	

Σ 1670. γ Virginis.

RA. 12 ^h 35 ^m 6 Decl. -0° 47'.					
1881.416	157.6	5.27	3	3	III
81.419	159.9	5.29	—	—	»
1881.42	158.7	5.28			

OΣ 253.

RA. 12 ^h 38 ^m 0 Decl. +21° 50'.					
1881.447	236.0	6.42	8	11	III

Probably unchanged.

Σ 1687. 35 Comae.

RA. 12 ^h 47 ^m 4 Decl. +21° 54'.					
A and B.					
1881.447	59.8	1.14	6	8	V
81.449	61.8	1.16	—	—	IV
1881.45	60.8	1.15			

β 925.

RA. 12 ^h 51 ^m 6 ^s Decl. +44° 12'.					
1882.406	209.2	6.44	6.5	13	II
82.411	209.8	6.53	—	—	»
1882.41	209.5	6.48			
1879.82	211.3	7.11	β 2 n.		

β 931.

RA. 13 ^h 4 ^m 51 ^s Decl. +13° 57'.					
1883.425	202.3	4.43	7	12	II
83.441	205.6	4.91	—	—	»
83.465	204.2	4.80	—	—	»
1883.44	204.0	4.71			
1879.25	204.9	4.89	β 4 n.		

OΣ 261.

RA. 13 ^h 6 ^m 4 Decl. +32° 43'.					
1885.436	347.4	1.04	6	7	III
85.447	348.2	1.05	—	—	»
1885.44	347.8	1.04			
1884.38	348.2	1.41	P 3 n.		
1870.03	350.8	1.09	Δ 8 n.		
1843.80	359.2	0.63	OΣ 2 n.		

β 237.

RA. 13 ^h 20 ^m 13 ^s Decl. +14° 58'.					
1883.425	204.2	3.08	8.5	11	II
83.441	204.4	2.89	—	—	»
83.465	204.1	2.75	—	—	»
1883.44	204.2	2.91			
1875.27	202.3	2.95	Δ 3 n.		

Σ 1785.

RA. 13 ^h 43 ^m 6 Decl. +27° 35'.					
1881.414	215.7	1.96	7	8	III

Σ 1819.

RA. 14 ^h 9 ^m 3 Decl. +3° 41'.					
1881.458	195.1	1.45	8	8	IV

Σ 1848.

RA. 14 ^h 22 ^m 6 Decl. +33° 29'.					
1883.425	359.1	2.68	8	12	II
83.441	1.0	2.68	—	—	»
1883.43	0.0	2.68			
1880.37	0.3	3.17	β 1 n.		
1869.57	1.0	3.27	Δ 5 n.		
1832.12	3.4	3.03	Σ.		

Σ 1865. ζ Bootis.

RA. 14 ^h 35 ^m 4 Decl. +14° 15'.					
1881.447	302.1	0.70	4	5	V

Σ 1877. ε Bootis.

RA. 14 ^h 39 ^m 8 Decl. +27° 35'.					
1880.414	326.8	3.01	3	6	III
81.438	323.6	2.96	—	—	II
81.447	326.3	2.98	—	—	III
87.458	323.4	2.82	—	—	»
87.485	328.6	3.16	—	—	»
1883.65	325.7	2.99			

Σ 1883.

RA. 14 ^h 42 ^m 9 Decl. +6° 28'.					
1881.458	253.9	0.72	7	7	IV

OΣ 289.

RA. 14 ^h 51 ^m 0 Decl. +32° 47'.					
1881.468	114.8	4.39	6	10	III

Apparently unchanged.

Σ 1937. η Coronae Bor.

RA. 15 ^h 18 ^m 2 Decl. +30° 43'.					
1887.427	186.6	0.82	5	5	V

OΣ 305.

RA. 16 ^h 7 ^m Decl. +33° 39'.					
1881.465	263.2	5.50	6	10	III

Probably unchanged.

OΣ 306.

RA. 16 ^h 7 ^m 3 Decl. +34° 43'.					
1886.177	45.7	0.3 ±	8	8	V

A close and very difficult pair.

1884.39	43.0	0.38	P 3 n.		
1846.56	55.9	0.37	OΣ 4 n.		

Σ 2032. σ Coronae Bor.RA. $16^h 10^m 2$ Decl. $+34^\circ 10'$.

1880.408	197.7	4.08	5	6	III
80.438	200.3	3.89	—	—	»
81.465	200.1	3.99	—	—	»
81.468	203.5	3.98	—	—	»
81.471	201.5	3.74	—	—	V
1881.05	200.6	3.94			

 Σ 2084. ζ Herculis.RA. $16^h 36^m 8$ Decl. $+31^\circ 49'$.

1881.458	108.1	1.23	3	6	V
81.468	109.8	1.60	—	—	III
81.471	109.3	1.50	—	—	»
81.642	109.5	1.32	—	—	»
1881.51	109.2	1.41			
1882.452	103.7	—	—	—	III
1889.641	70.7	1.51	—	—	III
89.644	72.9	1.44	—	—	V
89.649	71.7	1.69	—	—	III
1889.64	71.8	1.55			

 β 241.RA. $16^h 48^m 24^s$ Decl. $-21^\circ 22'$.

1887.562	165.3	0.42	7	7	V
1881.55	343.0	0.65	β 3 n.		
1879.06	159.6	0.63	Cin. 5 n.		
1888.56	164.2	0.6	L 2 n.		

 β 126.RA. $17^h 12^m 53^s$ Decl. $-17^\circ 38'$.

A and B.

1887.695	261.5	1.59	6.5	8	III
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A and C.

1887.695	138.2	11.12	—	12	
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Apparently unchanged.

 $O\Sigma$ 328. 68 Herculis.RA. $17^h 12^m 9$ Decl. $+33^\circ 14'$.

1882.540	61.3	4.47	5	10	II
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Apparently unchanged.

 β 46.RA. $17^h 18^m 7^s$ Decl. $+13^\circ 30'$.

1883.673	200.9	1.95	7.5	11	III
83.692	201.4	2.05	—	—	»
1883.68	201.1	2.00			
1875.01	203.0	2.15	Δ 4 n.		

 Σ 2161. ρ Herculis.RA. $17^h 19^m 5$ Decl. $+37^\circ 15'$.

1881.542	311.6	3.94	4	5	III
81.545	312.4	4.18	—	—	»

1881.54 312.0 4.06

Probably unchanged.

 β DM. $+30^\circ 29' 82$.RA. $17^h 20^m 19^s$ Decl. $+30^\circ 52'$.

1884.647	60.1	1.39	8.5	8.5	III
84.649	60.3	1.43	9	9	»
1884.65	60.2	1.41	8.7	8.7	

A.C. 7. μ^1 Herculis.RA. $17^h 41^m 47^s$ Decl. $+27^\circ 48'$.

B and C.

1881.471	252.9	—	10	10.3	IV
81.542	255.1	0.81	—	—	V
81.545	254.4	0.93	—	—	IV
82.515	263.4	0.89	—	—	III
82.520	260.6	0.88	—	—	»
82.542	260.8	0.93	—	—	»
83.518	260.1	0.83	—	—	»
83.542	263.0	0.80	—	—	»
83.638	260.0	0.88	—	—	»

1882.54 258.9 0.87

Orbit by Celoria (A.N. 2949): period 40.65 years.

 β 632.RA. $17^h 43^m 32^s$ Decl. $+34^\circ 19'$.

1882.531	344.0	5.48	7	12	III
1877.97	343.6	5.46	β 2 n.		

A.C. 9.

RA. $17^h 49^m 51^s$ Decl. $+29^\circ 50'$.

1883.644	229.5	0.88	8	8	III
83.687	229.1	0.95	—	—	»

1883.66 229.3 0.91

1874.40 230.9 0.97 Δ 6 n.

Apparently unchanged.

 $O\Sigma$ 339.RA. $17^h 51^m 0$ Decl. $+21^\circ 30'$.

1884.818	180.1	2.54	8	11	II
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Apparently unchanged.

 Σ 2267.RA. $17^h 57^m 8$ Decl. $+40^\circ 11'$.

1883.493	240.7	1.05	8	8	III
83.496	243.3	1.16	—	—	II

1883.49 242.0 1.10

1879.54 240.3 1.22 Hall 3 n.

1866.32 239.7 1.07 Δ 3 n.1849.34 240.3 1.51 $O\Sigma$ 7 n.1830.68 234.2 1.41 Σ 3 n.

Probably unchanged.

Σ 2356.RA. $18^h 33^m 7$ Decl. $+28^\circ 36'$.

1889.692	52.1	1.06	8	9	III
Apparently unchanged.					

 Σ 2400.RA. $18^h 43^m 5$ Decl. $+16^\circ 7'$.

A and B.

1885.616	193.1	1.74	8	11	III
85.627	193.4	1.78	8	11	»

1885.62	193.2	1.76			
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1884.08	198.8	2.44	P 6 n.
1872.61	236.3	1.02	$O\Sigma$ 1 n.
1851.62	275.3	1.77	$O\Sigma$ 1 n.
1829.18	305.2	2.96	Σ 2 n.

The star C was discovered by Perrotin.

A and C.

1885.627	193.2	1 \pm	—	11	
1884.08	198.9	1.43	P.		

 Σ 2441.RA. $18^h 58^m 1$ Decl. $+31^\circ 13'$.

1881.553	281.1	5.34	8	9	V
Probably unchanged.					

 Σ 2454.RA. $19^h 1^m 5$ Decl. $+30^\circ 15'$.

1881.553	235.7	0.64	8	10	V
81.623	227.7	0.76	8	10	»

1881.59	231.7	0.70			
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 Σ 2465.RA. $19^h 3^m 1$ Decl. $+30^\circ 29'$.

1881.542	253.8	1.22	8	10	IV
81.600	251.4	1.03	9	11	III
81.602	253.5	1.03	9	11	»
81.608	253.5	—	9	11	»
81.623	252.6	1.11	8.5	10	V
81.642	250.0	1.01	9	10	III

1881.60	252.5	1.08	8.6	10.3	
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Probably unchanged.

 Σ 2466.RA. $19^h 3^m 2$ Decl. $+29^\circ 37'$.

1881.600	105.4	2.28	8	8.5	II
81.602	104.3	2.50	—	—	III

1881.60	104.8	2.39			
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Probably unchanged.

 Σ 2469.RA. $19^h 3^m 7$ Decl. $+38^\circ 44'$.

1881.564	116.4	1.26	8	9	IV
81.583	121.0	1.24	—	—	»

1881.57	118.7	1.25			
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Probably unchanged.

 Σ 2481.RA. $19^h 7^m 1$ Decl. $+38^\circ 35'$.

A and BC.

1881.564	223.4	4.13	8	8	V
81.583	226.0	4.12	—	—	»

1881.57	224.7	4.12			
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B and C. Discovered by Secchi.

1881.567	59.5	0.33	—	9	V
81.573	66.9	»	—	—	»
81.581	59.4	»	—	—	»

1881.57	61.9	0.33			
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Distance by thickness of micrometer wire.

A and BC.

1883.59	223.7	4.09	P 4 n.
1879.69	223.4	4.15	Hall 2 n.
1855.56	229.4	4.02	$O\Sigma$ 4 n.
1830.45	234.3	3.83	Σ 3 n.

B and C.

1877.31	249.8	0.37	Δ 2 n.
1866.74	88.7	0.59	$O\Sigma$ 1 n.
1858.22	95.5	0.4	S.

The close pair have undoubtedly changed in bot angle and distance.

 β 139.RA. $19^h 7^m 11^s$ Decl. $+16^\circ 39'$.

1883.657	140.8	0.55	8	8.2	III
83.660	141.0	0.57	—	—	V

1883.66	140.9	0.56			
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1875.88	139.5	0.72	Δ 6 n.
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Probably unchanged.

 β 975. AC = $O\Sigma$ 367.RA. $19^h 10^m 4^s$ Decl. $+34^\circ 21'$.

A and BC.

1881.623	226.6	33.54	8	10	III
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A and D.

1881.626	68.4	22.95	—	12	III
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B and C.

1881.623	225.4	0.76	10	10	V
81.626	218.9	0.89	10	10.2	III
81.642	216.7	0.81	10	10.5	»

1881.63	220.3	0.82	10	10.2	
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1880.59	221.8	0.77	β 3 n.
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β 248. 2 Vulpeculae.RA. $19^h 12^m 39^s$ Decl. $+22^\circ 49'$.

A and B.

1881.615	124.1	1.79	6	10	III
81.661	125.3	1.77	6	10	IV

1881.64	124.7	1.78			
1876.11	125.0	1.86	Δ 6 n.		

A and C.

1881.661	119.7	50.4	—	11	
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Schj. 30 = β 142.RA. $19^h 21^m 30^s$ Decl. $-12^\circ 23'$.

1883.581	326.4	1.14	7	7.2	III
83.592	325.5	1.16	—	—	›
83.687	325.6	1.09	—	—	II

1883.62	325.8	1.10			
1874.08	317.7	1.37	Δ 5 n.		
1888.54	328.3	1.60	L. 3 n.		

Change probable.

 $O\Sigma$ 376.RA. $19^h 30^m 6$ Decl. $+33^\circ 56'$.

1881.600	230.0	2.42	7	10	III
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Apparently unchanged.

 Σ 2552.RA. $19^h 32^m 6$ Decl. $+19^\circ 5'$.

1881.583	194.2	5.01	7	9	II
81.642	195.0	5.37	—	—	III
1881.61	194.6	5.19			

Unchanged.

 Σ 2576.RA. $19^h 41^m 0$ Decl. $+33^\circ 20'$.

1881.534	121.1	3.03	8	8	IV
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 Σ 2579. δ Cygni.RA. $19^h 41^m 2$ Decl. $+44^\circ 50'$.

1881.581	333.3	1.51	3	8	IV
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 $O\Sigma$ 387.RA. $19^h 44^m 2$ Decl. $+35^\circ 0'$.

1882.687	8.5	0.48	8	8	V
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Orbit by Prof. S. de Glasenapp: period 110 years.

 β 830.RA. $19^h 49^m 2^s$ Decl. $-1^\circ 9'$.

1886.799	109.3	2.79	7.5	12	III
86.802	103.3	2.60	8	12	›
1886.80	106.3	2.69	7.7	12	

1881.74	106.4	2.72	β 2 n.		
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 Σ 2620.RA. $19^h 58^m 5$ Decl. $+11^\circ 27'$.

1883.695	292.3	1.83	8	9	III
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Unchanged.

 β 833.RA. $20^h 5^m 11^s$ Decl. $-6^\circ 30'$.

B and C.

1884.821	58.4	2.10	8.5	11.5	III
1881.74	63.7	2.30	β 2 n.		

 $O\Sigma$ 400.RA. $20^h 6^m 3$ Decl. $+43^\circ 35'$.

1887.709	122.7	0.3±	7	8	V
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Distance probably less than 0.30.

Orbit by J. E. Gore: period 170 years.

 β 984. DM. $+26^\circ 3849$.RA. $20^h 11^m 19^s$ Decl. $+26^\circ 7'$.

1883.689	20.7	0.68	8	8	V
83.720	19.0	0.58	8	8	›
1883.70	19.8	0.63			

1880.47	204.1	0.86	β 2 n.		
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My observation for position makes this star DM. $+25^\circ 4184$. β Capricorni.RA. $20^h 14^m 2^s$ Decl. $-15^\circ 10'$.

1886.701	108.7	0.81	6	9	V
86.750	110.5	0.85	—	—	›
1886.72	109.6	0.83			

 Δ Radcliffe 4778.RA. $20^h 21^m 10^s$ Decl. $+39^\circ 42'$.

1882.692	138.0	2.88	8	9	II
86.887	139.1	2.67	8	9	III
89.928	138.0	2.68	8	9	›

1886.50	138.4	2.74	8	9	
1875.13	139.7	2.77	Δ 4 n.		

Unchanged.

 $O\Sigma$ 407 = D. 1.RA. $20^h 25^m 5$ Decl. $+10^\circ 51'$.

1887.657	210.2	0.32	7	7.5	V
87.711	203.8	0.3±	—	—	›
1887.68	207.0	0.32			

1879.43	211.5	0.51	β 1 n.		
1869.98	203.7	0.49	Δ 6 n.		
1846.95	212.3	0.57	$O\Sigma$ 4 n.		
1841.95	211.4	0.65	D 11 n.		

A change in distance appears probable.

A.C. 18. 44 Cygni.

RA. $20^{\text{h}}26^{\text{m}}26^{\text{s}}$ Decl. $+36^{\circ}32'$.

1882.692	150.6	2.19	6.5	11	III
82.698	154.7	1.89	—	—	»
83.750	154.5	1.66	—	—	»
83.753	157.3	1.94	—	—	»
84.769	160.6	1.82	—	—	»

1883.53	155.5	1.90			
1864.79	157.9	2.26	Δ	11 n.	

 β 151. β Delphini.RA. $20^{\text{h}}31^{\text{m}}55^{\text{s}}$ Decl. $+14^{\circ}11'$.

A and B.

1887.747	308.1	$0.3 \pm$	4	6	V
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The distance probably less than $0''.30$.

 β 677.RA. $20^{\text{h}}42^{\text{m}}23^{\text{s}}$ Decl. $+33^{\circ}56'$.

1881.645	118.9	9.85	6	11	II
81.683	120.4	9.40	—	12	»
81.799	120.1	9.69	—	12	»

1881.709	119.8	9.65	6	11.7	
1877.83	301.3	9.66	β	3 n.	

 β requires correction to angle: -180° . $O\Sigma$ 413. λ Cygni.RA. $20^{\text{h}}42^{\text{m}}7^{\text{s}}$ Decl. $+36^{\circ}3'$.

1887.703	76.1	0.72	5	6	V
87.706	75.9	0.76	—	7	»
1887.70	76.0	0.74	5	6.5	

Orbit by Prof. S. de Glasenapp: period 93.4 years.

 $O\Sigma$ 415.RA. $20^{\text{h}}45^{\text{m}}6^{\text{s}}$ Decl. $+29^{\circ}58'$.

1882.619	239.4	3.66	8.5	9	II
82.655	237.9	3.65	—	—	»
82.673	234.2	3.34	—	—	»

1882.65	237.2	3.55			
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Unchanged.

H. 3003.

RA. $20^{\text{h}}45^{\text{m}}59^{\text{s}}$ Decl. $-24^{\circ}14'$.

1883.689	217.9	1.74	7	9	III
83.753	219.2	1.94	—	—	»

1883.72	218.5	1.84			
1878.71	218.6	2.01	Cin.	2 n.	

Probably unchanged.

 Σ 2739.RA. $20^{\text{h}}54^{\text{m}}3^{\text{s}}$ Decl. $+19^{\circ}36'$.

1881.615	252.5	—	8	9	III
82.668	252.8	3.17	—	—	II

1882.14	252.6	3.17			
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Unchanged.

 β 69.RA. $20^{\text{h}}57^{\text{m}}10^{\text{s}}$ Decl. $+21^{\circ}9'$.

1881.623	313.7	0.91	8	8.5	III
81.626	314.2	0.85	8	8.5	V
1881.62	313.9	0.88	8	8.5	
1875.42	314.6	0.97	Δ	3 n.	

 β 445.RA. $20^{\text{h}}58^{\text{m}}23^{\text{s}}$ Decl. $+28^{\circ}37'$.

1881.623	106.3	4.82	7	11	II
81.629	111.0	4.89	—	11.5	III
81.653	108.8	—	—	11	»
82.678	109.3	4.47	—	12	II

1881.89	108.9	4.73	7	11.4	
1877.58	106.6	4.60	Δ	1 n.	

 $O\Sigma$ 427.RA. $20^{\text{h}}58^{\text{m}}6^{\text{s}}$ Decl. $+30^{\circ}35'$.

1886.785	149.3	5.17	8	11	II
86.788	149.8	5.09	—	—	»

1886.79	149.5	5.13			
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Apparently unchanged.

 Σ 2762.RA. $21^{\text{h}}3^{\text{m}}6^{\text{s}}$ Decl. $+29^{\circ}43'$.

1882.636	310.5	3.49	6	8	II
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Probably unchanged.

 $O\Sigma$ 535. δ Equulei.RA. $21^{\text{h}}8^{\text{m}}6^{\text{s}}$ Decl. $+9^{\circ}31'$.

1887.747	189.4	$0.4 \pm$	4.5	5	V
87.815	201.0	0.49	—	—	»

1887.78	105.2	0.49			
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1889.824	193.1	$0.2 \pm$	—	—	V
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The distance in 1889 certainly less than $0''.3$.

1888.69	189.9	0.25	β	4 n.	
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Orbit by M. Wroublewsky: period 11.48 years.

A. G. C. 13. τ Cygni.RA. $21^{\text{h}}9^{\text{m}}58^{\text{s}}$ Decl. $+37^{\circ}31'$.

1886.887	$80 \pm$	$0.5 \pm$	4.5	9	V
87.758	56.4	$0.4 \pm$	—	—	»

1888.733	single	β	1 n.		
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 β DM. $+15^{\circ}4384$.RA. $21^{\text{h}}10^{\text{m}}29^{\text{s}}$ Decl. $+15^{\circ}35'$.

1886.755	151.6	1.35	8.5	11	III
86.777	151.4	1.44	8.5	11	»

1886.76	151.5	1.39	8.5	11	
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 Σ 2785.RA. $21^{\text{h}}12^{\text{m}}9^{\text{s}}$ Decl. $+39^{\circ}15'$.

1882.636	235.6	2.82	8	10	II
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Probably unchanged.

β 289.RA. $21^{\text{h}} 13^{\text{m}} 22^{\text{s}}$ Decl. $+34^{\circ} 25'$.

1881.645	130.4	0.67	9	11	V
1878.529	137.8	0.90	β 1 n.		

O Σ 437.RA. $21^{\text{h}} 15^{\text{m}} 8$ Decl. $+31^{\circ} 57'$.

1881.706	53.6	1.39	6.5	7	III
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 β 447.RA. $21^{\text{h}} 18^{\text{m}} 45^{\text{s}}$ Decl. $+24^{\circ} 48'$.

1881.672	331.1	9.14	6	12.5	III
1878.21	330.4	8.52	β 2 n.		

Madison 45.

RA. $21^{\text{h}} 25^{\text{m}} 21^{\text{s}}$ Decl. $+34^{\circ} 32'$.

1882.675	197.2	1.10	8.5	8.5	III
82.684	196.8	1.14	8.2	8.5	»
1882.68	197.0	1.12	8.3	8.5	
1881.49	17.8	1.28	β 3 n.		

 β 167.RA. $21^{\text{h}} 31^{\text{m}} 1^{\text{s}}$ Decl. $+29^{\circ} 31'$.

1881.703	88.9	2.27	7	11	III
81.725	87.2	1.92	—	—	»
81.753	87.9	1.73	—	—	»
1881.73	88.0	1.97			
1876.48	89.2	2.08	Δ 4 n.		

D. 15.

RA. $21^{\text{h}} 33^{\text{m}} 8$ Decl. $+42^{\circ} 45'$.

1881.593	69.5	1.46	8	10	V
1873.89	72.2	1.30	Δ 4 n.		

O Σ 447.RA. $21^{\text{h}} 34^{\text{m}} 7$ Decl. $+41^{\circ} 11'$.

A and B.

1889.942	45.1	28.85	7	8	III
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A and C.

1889.942	170.5	13.81	—	11	III
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A and D = β 449.

1889.942	239.6	15.70	—	13	
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A.C. 20. 75 Cygni.

RA. $21^{\text{h}} 35^{\text{m}} 28^{\text{s}}$ Decl. $+42^{\circ} 43'$.

A and B.

1881.583	322.8	2.74	5	11	III
81.586	323.1	2.44	—	—	»
81.589	324.9	2.60	—	—	IV
1881.59	323.6	2.59			
1875.16	322.3	2.71	Δ 6 n.		

A and C = O Σ 221.

1881.583	254.4	54.47	—	9	
1875.69	254.5	54.44	Δ 4 n.		

 β 688.RA. $21^{\text{h}} 37^{\text{m}} 43^{\text{s}}$ Decl. $+40^{\circ} 30'$.

1887.701	27.1	0.3 \pm	8	8	V
87.763	37 \pm	0.4 \pm	—	—	»

Very close and difficult.

1878.1	209.2	0.38	β 4 n.		
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 β 692.RA. $21^{\text{h}} 44^{\text{m}} 49^{\text{s}}$ Decl. $+31^{\circ} 17'$.

1881.725	12.7	2.79	8	11	III
1878.24	10.8	2.48	β 2 n.		

O Σ 454.RA. $21^{\text{h}} 50^{\text{m}} 6$ Decl. $+23^{\circ} 46'$.

1881.681	277.7	7.15	7	9	II
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Unchanged.

Madison 51.

RA. $22^{\text{h}} 29^{\text{m}} 29^{\text{s}}$ Decl. $+1^{\circ} 57'$.

1884.862	178.5	0.86	8.5	9	III
84.865	176.3	0.89	—	—	»
1884.86	177.4	0.87			
1881.63	181.1	0.90	β 3 n.		

 β 178. Aquarii 252.RA. $22^{\text{h}} 48^{\text{m}} 57^{\text{s}}$ Decl. $-5^{\circ} 38'$.

1884.867	321.5	0.68	6	9	V
1878.42	325.8	0.66	Cin. 3, 1 n.		
1875.37	324.6	Cuneo	Δ 3 n.		
1888.87	322.2	0.70	L 3 n.		

Probably unchanged.

Ho. 194.

RA. $23^{\text{h}} 0^{\text{m}} 34^{\text{s}}$ Decl. $+21^{\circ} 9'$.

1886.887	67.9	0.43	7	7	V
87.706	72.7	0.3 \pm	7	7	»
1887.29	70.3	0.43	7	7	
1885.84	59.9	0.3 \pm	7.9	Ho. 2 n.	

This pair was rediscovered in 1886 and measured as new. The regular increase in the angles appears to indicate a rather rapid binary.

β 852.
RA. $23^h 4^m 50^s$ Decl. $+25^\circ 52'$.

A and BC.

1881.772	283.2	—	7	9	II
81.810	283.0	58.25	7	9	III
81.815	283.6	58.25	7	9	»
1881.80	283.3	58.25			
1881.61	282.6	58.55	β 3 n.		

B and C.

1881.772	10.0	1.44	—	9.5	III
81.813	10.1	1.51	—	—	»
1881.79	10.0	1.47			
1881.62	11.2	1.20	β 3 n.		

β 181.
RA. $23^h 7^m 31^s$ Decl. $-14^\circ 3'$.

A and B.

1884.865	304.5	1.45	7	11	III
84.867	311.0	1.48	—	—	»
1884.87	307.7	1.46			
1876.26	309.2	1.51	Δ 4 n.		
1888.77	305.3	1.31	L 3, 1 n.		

A and C.

1884.867	236.3	19.74	—	13	
1877.736	234.9	18.78	β 1 n.		

β 182.
RA. $23^h 10^m 54^s$ Decl. $-14^\circ 57'$.

1884.867	44.1	0.62	8	8	V
1876.28	42.3	0.83	Δ 4 n.		
1888.77	225.4	0.74	L 2 n.		

Dearborn Observatory, Evanston, Ill., 1890 March 6.

β 389.
RA. $23^h 35^m 18^s$ Decl. $+31^\circ 54'$.

A and B.

1881.687	273.1	0.49	7	7	V
81.758	274.8	0.58	7	7	»
1881.72	273.9	0.53			
1881.57	276.6	0.48	β 3 n.		

AB and C.

1881.758	50.5	23.78	—	13	
1881.62	51.0	23.66	β 3 n.		

A.G.C. 14. 78 Pegasi.
RA. $23^h 37^m 57^s$ Decl. $+28^\circ 42'$.

1881.887	191.8	1.48	5	8	III
1878.77	191.8	1.61	β 2 n.		
1876.59	192.0	1.46	Δ 4 n.		

β 860.
RA. $23^h 53^m 54^s$ Decl. $+38^\circ 11'$.

1881.815	105.5	6.27	6.5	11	II
81.854	105.3	6.37	—	—	»
1881.83	105.4	6.32			
1881.72	107.2	6.70	β 4 n.		

$O\Sigma$ 514.
RA. $23^h 58^m 4$ Decl. $+41^\circ 25'$.

1881.845	161.2	4.87	6	10.5	II
81.854	166.2	5.23	—	—	III
1881.85	163.7	5.05			

Probably unchanged.

G. W. Hough.

Vermischte Nachrichten.

(Aus dem Anzeiger der Wiener Akademie 1890 Nr. IX.)

S. Oppenheim. Bahnbestimmung des Cometen 1846 VIII. Aus dem gesammten Beobachtungsmateriale, das, wenn es sich auch über 32 Tage erstreckt, und zwar vom 23. September 1846, dem Tage der Entdeckung durch De Vico in Rom, bis zum 25. October, doch nur 10 Beobachtungen fasst, ergab sich die folgende wahrscheinlichste Parabel:

$$\left. \begin{aligned} T &= 1846 \text{ Oct. } 29.814431 \text{ M. Z. Berlin} \\ \omega &= 93^\circ 58' 15''.8 \\ \Omega &= 4 \ 41 \ 23.8 \\ i &= 49 \ 41 \ 59.5 \\ \log q &= 9.919428 \end{aligned} \right\} \text{Mittl. Aequ. 1846.0}$$

mit einer geringen, aus den Beobachtungen jedoch nicht mit Sicherheit zu constatirenden Neigung gegen die Hyperbel.

Inhalt:

Zu Nr. 2977-78. G. W. Hough. Catalogue of 94 New Double Stars and Measures of 107 Double Stars. I. — Vermischte Nachrichten. 31.