ASTRONOMISCHE NACHRICHTEN.

Nr. 4301-02.

Band 180.

5-6.

Double star measures

made with the 40-inch Refractor of the Yerkes Observatory.

By *S. W. Burnham.*

The introductory remarks to my double star measures printed in A. N. 4209 and 4261 apply to the observations given here, and need not be repeated. The purpose throughout has been to supply the observations wanted to show the present relation of stars not previously or recently measured; to confirm or negative apparent changes from proper motion or otherwise; and to record measures, which either now or in a future more or less remote, should have a special value. In this interest many of the measures relate to the question of proper motion in one or more of the observed stars, and tend to confirm or correct the movement deduced from meridian observations.

That these values from transit positions in very many of the stars are somewhat uncertain in amount and direction, and especially where the movement is small, is obvious from the very different results obtained by the various computers. Small stars, or those below the tenth magnitude, having any certain proper motion are excessively rare. After the use of the micrometer by experts for at least three quarters of a century, only a few examples have been found of small stars having any sensible independent proper motion. The General Catalogue of Double Stars, which includes nearly all the relative positions of small and other stars obtained with the micrometer from the earliest reliable results to the present time, furnishes two or three examples of stars of this class which are actually moving in space, and perhaps a few others where a suspected small motion may be confirmed by other measures hereafter. I have previously called attention to the most remarkable example I have been able to find of a small star with a decided proper motion in Monthly Notices for May, 1908. To argue that small stars have some motion in certain instances because the relative change does not correspond to the proper motion that has been assigned to the large stars, would be begging the whole question, and the conclusion therefrom is not worthy of serious consideration.

Of course this has no reference to a large class of stars, extending in magnitude to the limit of visibility in the largest telescopes, which are moving in space with much brighter stars, and at nearly or exactly the same rate and direction. The General Catalogue contains several hundred examples of stellar systems of this order, where the small star may be as faint as the sixteenth magnitude; but ob-

viously these members of vast systems of some kind have nothing whatever to do with the general question of the proper motion of small stars. On the whole it is very remarkable that so few instances of motion have been discovered, considering the time and the number of observers engaged in the work. Doubtless, photography will hereafter detect perhaps many other small stars in motion.

The best if not the only way to improve our knowledge of the proper motion of the large stars is by systematic micrometric comparisons with stars from the tenth to the fifteenth magnitude. Conclusions derived from measures of a comparison star a magnitude or two brighter will rarely require any modification. It is a significant fact, and one having an important bearing on this question of the general absence of any sensible proper motion in the small stars, that when two or more comparison stars are used, they give practically the same value for the movement of the bright star, and the correction to that motion as derived from meridian observations is usually not larger, and sometimes much less, than the differences in the values by different computers. It may be noted further that when any of these small stars have been measured with reference to other small stars near by, the absence of any relative change has been the invariable result.

The measures given here do not by any means include all that has been done in this interval, but only those stars which are fully measured, and therefore disposed of for the time being. The other stars remain on the working-list until they are observed in like manner. With few exceptions it is a matter of no consequence that the measures of a pair are spread over two or more years, provided the separate results are brought together at one time. All stars of every class should be measured on at least three nights to give the best result the observer is capable of producing to say nothing of the freedom from accidental errors; and it goes without saying that if a star is worth observing at all, it should and will receive this amount of attention from the thorough and experienced observer. To confine the measures of double stars to the known binaries, however valuable and interesting that work may be, would be taking a very narrow and limited view of the fields not fully investigated, and the things imperfectly known.

β GC. 7. β 1014.

1908.583	335.7	1.47
.671	334.3	1.58
1908.63	335.0	1.52

These measures show that there has been no change since 1891.

32. O. Stone 1.

There is an error in the Cincinnati place of this star. It is identical with Σ 3065 rej. (No. 14). All the measures cited belong to Σ 3065 rej.

113. Hd 10. ($10^m 7$, $11^m 3$).

1908.652	237.4	31.52
.655	239.0	30.97
.709	238.8	31.21
1908.67	238.4	31.23

The note in GC. as to this pair following a $7^m 5$ star, belongs to Hd 13 (No. 124) as given in Part I. The distance of Hd 10 in the measure of 1903 is much too large.

119. Hd 11. ($9^m 8$, $10^m 7$).

1908.633	290.5	36.41
.636	291.4	36.34
.652	291.0	36.60
1908.64	291.0	36.45

It was obvious that one or the other of the prior single measures of this star must be wrong.

136. H 1951.

1908.633	218.4	22.87
.652	217.7	22.98
.655	216.5	22.95
1908.65	217.5	22.93

165. 42 Piscium. Σ 27.

1908.613	332.1	29.05
.633	333.3	29.23
.636	332.0	29.08
.652	331.9	29.00
1908.63	332.3	29.09

The six positions on 20 nights by Σ , Δ , H1 and β (1829-1908) give for the corrected proper motion of 42 Piscium:

$0^m 083$ in $46^s 3$.

242. 12 Ceti. H 322.

1908.728	188.4	9.86
.824	190.4	9.63
.826	190.1	9.75
1908.79	189.6	9.75

The proper motion of the large star according to Auwers is:

$0^m 010$ in $206^s 5$.

262. $O\Sigma$ 13.

A and C.

1908.843	164.7	29.09
.845	162.9	29.30
.862	164.2	29.30
1908.85	163.9	29.23

A and D.

1908.843	179.3	41.42
.845	179.0	41.27
.862	180.5	41.44
1908.85	179.6	41.38

304. Σ 38.

1908.788	145.0	16.87
.804	145.5	17.00
.826	144.5	16.93
1908.81	145.0	16.93

Certainly unchanged.

345. $O\Sigma$ (App.) 5.

1908.709	143.75	116.68
.711	143.21	116.05
.728	143.33	116.27
1908.72	143.43	116.33

The change, if any, is small.

361. α Cassiopejae.

A and C.

1908.785	105.1	38.30
.788	103.9	38.13
.804	105.4	38.39
1908.79	104.8	38.27

A and D.

1908.655	280.26	64.16
.673	280.22	64.06
.689	280.09	64.23
.692	280.02	64.06
1908.68	280.15	64.13

From the measures of $O\Sigma$ and β on 29 nights, the real proper motion of the large star is:

$0^m 054$ in $116^s 4$.

It is specially important that the measures of AC should be continued.

384. Σ 53 rej.

A and B.

1907.845	340.4	28.80
8.000	341.0	28.89
8.044	340.8	28.38
1907.96	340.7	28.69

The five positions by Eng., A and β (1891-1907) give for the proper motion of the primary:

$0^m 252$ in $212^s 7$.

This movement from meridian observations is somewhat uncertain in amount. The companion star, however, is large enough to have possibly a small motion of its own; and I have connected with it a third $12^m 5$ star. A set of measures a few years hence will show at once whether or not B is fixed.

B and C.

1907.845	25.03	128.39
8.000	24.18	128.31
8.597	26.08	128.08
1908.15	25.10	128.26

397. A.G. 7. ($9^m 7$, $11^m 0$).

1908.750	318.4	21.52
.788	317.5	21.32
.824	319.0	20.91
1908.79	318.3	21.25

Early measures disagree in distance.

400. H 6.

This is identical with the last preceding pair, A.G. 7.

408. H 7. ($10^m 0$, $11^m 3$).

1908.750	308.4	21.12
.788	308.4	21.06
.824	308.0	20.97
1908.79	308.3	21.05

This is BD + 1190. Error of 180° in H. No other measures.

437. $O\Sigma$ (App.) 9.

A and B.

1908.652	237.07	97.86
.655	237.30	97.45
.673	237.45	97.51
1908.66	237.27	97.61

A and C.

1908.652	323.08	107.39
.655	323.37	107.33
.673	323.50	107.33
1908.66	323.32	107.35

The only other measure of AC is:

1892.03 324°52 105°70 2n Eng.

Assuming C to be fixed, as it probably is, the proper motion of A from the two positions is:

0°167 in 90°5.

To determine this hereafter, I have measured a small star from C:

C and c (9^m6 , 11^m1).

1908.652	218°8	19°50
.655	220.1	19.74
.673	220.0	19.73
1908.66	219.6	19.66

458. β 497.

A and B.

1908.652	170°68	126°68
.655	170.93	126.86
.673	171.12	127.20
.689	171.06	127.20
1908.67	170.95	126.98

The six positions by Eng. and β give for the proper motion of the large star (Bradley 90):

0°181 in 340°5.

Another value from meridian observations is:

Auwers 0°152 in 328°9.

545. Σ 83 rej. (8^m0 , 11^m0).

1908.559	312°6	21°97
.573	313.6	21.89
.597	312.9	21.90
1908.58	313.0	21.92

558. H 1065. (9^m4 , 11^m4).

1908.520	158°5	23°34
.537	158.8	23.37
.573	158.6	23.55
1908.54	158.6	23.42

This is BD +27°171, and not H 631 which could not be found.

561. 72 Piscium. H 1068.

1908.652	260°86	55°27
.655	260.17	54.72
.671	261.20	55.43
.673	261.62	55.29
1908.66	260.96	55.18

649. H 2028.

A and B.

1908.709	203°80	61°38
.711	203.97	61.10
.728	203.75	61.05
1908.72	203.84	61.18

There has been no relative change, and therefore the proper motion must be exactly the same. For a better determination of this hereafter, I have measured a third star:

B and C. (12^m2).

1908.709	210°60	47°08
.711	209.47	47.20
.728	210.68	46.21
1908.72	210.25	46.83

652. $O\Sigma$ 28.

A and B.

1908.728	306°9	0°92
.731	306.3	0.67
.750	302.5	0.85
1908.74	305.2	0.81

AB and C.

1908.709	25°85	130°20
.711	25.60	130.36
.728	25.82	130.11
1908.72	25.76	130.22

C and D. (11^m0).

1908.709	156°60	66°48
.711	155.83	66.55
.728	155.75	66.60
1908.72	156.06	66.54

In the measures by Δ , C is treated as the primary. As printed in Part I it is 180° in error.

658. H 2030.

A and B. (9^m0 , 12^m5).

1908.728	48°0	24°12
.750	48.9	24.02
.766	49.2	23.98
1908.75	48.7	24.04

A and C. (9^m2).

1908.728	193°2	38°66
.750	193.2	38.62
.766	193.6	38.69
1908.75	193.3	38.66

A and C are respectively BD +52°297 and +53°266; and the RA. should be $1^h 9^m 31^s$.

672. Σ 102.

AB and C.

1908.709	225°5	10°15
.711	224.2	10.20
.728	223.7	10.10
1908.72	224.5	10.15

AB and D.

1908.709	62°85	27°03
.711	63.07	27.03
.728	62.48	27.16
1908.72	62.80	27.07

It is practically certain that the change in D is due to the proper motion of AB; but for greater certainty I have connected another faint star.

D and E.

1908.709	355°72	97°96
.711	355.37	97.52
.728	355.02	98.02
1908.72	355.37	97.83

E and e. (11^m1 , 13^m0).

1908.728	54°7	10°17
.750	53.0	10.30
1908.74	53.8	10.23

673. H 1077. (8^m1 , 10^m9).

1908.711	294°8	38°77
.750	294.7	38.60
.766	294.7	38.30
1908.74	294.7	38.56

No other measures.

794. Σ 132.

A and a. (14^m2).

1908.750	154°1	14°41
.788	153.3	14.05
.824	154.7	13.99
1908.79	154.0	14.15

A and C.

1908.652	228°90	68°75
.655	228.95	68.77
.673	229.13	68.56
1908.66	228.99	68.69

A and D.

1908.652	113°03	135°61
.655	113.17	135.72
.673	113.35	134.98
1908.66	113.18	135.44

D and d. ($10^m 1$, $10^m 7$).

1908.652	287.7	5.47
.655	288.0	5.89
.673	288.2	5.39
1908.66	288.0	5.58

The only prior measures of these stars are the following:

AC 1888.14 225°72 68°86 1n Eng.
AD 1888.14 114.15 140.23 1n Eng.

These positions unfortunately depend upon a single observation. Comparing them with the recent measures, we have for the proper motion of A:

AC	RA. +0.123	Decl. -0.146
AD	+0.168	-0.197
	+0.145	-0.171

Further measures of these stars will decrease the error probable in the result given here.

Measures 0.224 in 139°7
Auwers 0.248 in 157.8

A comparison of the present position of the faint star α with the rough setting of 1904 tends to show that it is not moving in space with the other.

843. $\Sigma 139$.

A and B.

1908.518	223.5	9.83
.556	222.1	9.90
.559	223.1	10.02
1908.54	222.9	9.92

No change since Dembowski. Two faint stars closely p AB.

A and C. ($9^m 4$).

1908.518	87.45	107.63
.556	88.07	107.16
.559	87.87	107.14
1908.54	87.80	107.31

The only other observation of this is:

1887.46 87°97 106°89 3n Bl

The difference is undoubtedly due to errors of observation.

941. $\Sigma 162$.

A and D. ($9^m 7$).

1908.518	95.88	135.63
.559	95.77	135.23
.573	95.73	135.62
1908.55	95.79	135.49

D is BD +47°509. The only other measure is:

1881.46 95°40 133°96 3n Bl

As the separate distances differ by more than 1", it would be unsafe to infer any real change.

951. $\Sigma 163$.

A and C. ($9^m 7$).

1908.518	254.28	114.65
.556	254.54	115.01
.559	254.60	114.70
1908.54	254.47	114.79

The only prior position is:

1879.40 254°25 114°79 2n Bl

1037. $\Sigma 192$.

A and C. ($9^m 0$).

1908.518	145.82	76.02
.556	146.12	76.10
.559	145.94	75.85
1908.54	145.96	75.99

C is BD +57°448. The only measure is:

1881.46 145°47 77°15 3n Bl

1083. 61 Ceti.

A and B.

1908.652	193.50	42.68
.671	193.57	42.96
.689	193.58	43.16
1908.67	193.55	42.93

A and C.

1908.652	325.75	83.27
.671	325.88	82.71
.689	325.68	83.58
1908.67	325.77	83.19

1103. A.G. 31. ($9^m 5$, $12^m 8$).

1908.785	147.2	32.91
.788	146.1	31.59
.824	146.9	32.37
1908.80	146.7	32.29

Disagrees with former position.

1136. $\Sigma 225$.

A and C. ($10^m 4$).

1908.597	161.25	150.45
.613	161.00	150.32
.633	161.16	150.26
1908.61	161.14	150.34

An earlier position is:

1881.09 161°00 149°29 3n Bl

1149. 66 Ceti. $\Sigma 231$.

A and B.

1908.709	232.0	15.82
.711	231.1	16.01
.766	231.4	15.88
1908.73	231.5	15.90

A and C. ($11^m 8$).

1908.824	61.29	172.92
.843	61.09	172.78
.862	61.00	172.36
1908.84	61.13	172.69

The large common proper motion of the bright stars is well known. For future use I have connected the nearest outside star.

Hd 56 (No. 1142) should be in the field. There must be a large error in the Hd place. I could not find it anywhere in the vicinity.

1198. 10 Trianguli. H 1115.

1908.766	204.9	57.27
.788	204.8	57.51
.804	205.2	57.43
1908.79	205.0	57.40

The large star has no sensible proper motion.

Auwers 0.015 in 344.2.

1239. A.G. 38.

A and B. ($8^m 7$, $8^m 9$).

1908.709	260.58	34.44
.728	260.73	34.53
.766	260.90	34.48
1908.73	260.74	34.48

A and C. ($11^m 5$).

1908.709	180.12	126.16
.766	180.63	126.10
1908.74	180.37	126.13

The larger components are supposed to have some proper motion.

1262. ι Cassiopeiae. $\Sigma 262$.

C and D.

1908.520	56.90	206.12
.537	56.88	206.20
.556	57.00	205.83
1908.54	56.93	206.05

For comparison we have:

1880.42 56°70 205°66 2n Bl

1291. β 304.

1908.520	283°2	20"26
.613	282.7	19.94
.636	283.4	19.90
.652	282.5	19.73
1908.61	282.9	19.96

Distance increasing from proper motion.

1294. Ku 10. ($9^m 4$, $9^m 8$).

1908.613	355°9	3"30
.636	358.5	3.42
.692	355.0	3.38
1908.65	356.5	3.37

1317. Σ 277.A and C. ($10^m 0$).

1908.537	22°45	161"90
.556	22.20	161.66
.559	22.14	161.74
1908.55	22.26	161.77

No evidence of change.

1881.48 22°43 161"19 3n Bl

1374. Σ 291.

A and B.

1907.692	118°6	3"19
.695	117.4	3.39
.769	118.9	3.14
1907.72	118.3	3.24

A and C.

1907.692	241°2	65"55
.695	241.2	65.35
.769	241.2	65.26
1907.72	241.2	65.39

B and C.

1907.692	243°8	67"53
.695	243.9	67.35
1907.69	243.85	67.44

South's angle of AC is $31^{\circ}5$ sp. This was erroneously reduced as sf; therefore in Part I of G.C. for $121^{\circ}5$ read $238^{\circ}5$.

1379. H 1122. ($9^m 5$, $10^m 2$).

1908.597	216°5	10"26
.633	216.0	10.31
.636	217.6	10.18
1908.62	216.7	10.25

No other measures.

1406. Espin 9.

A and B. ($8^m 0$, $11^m 6$).

1907.807	29°9	2"45
.7867	27.8	2.70
.8559	25.1	2.49
.8573	26.1	2.42
1908.20	27.2	2.52

A and C. ($13^m 5$).

1907.867	302°9	10"22
.8597	305.3	10.37
1908.23	304.1	10.30

The faint star not previously seen.

1428. Espin 120. ($8^m 8$, $13^m 4$).

1907.807	72°3	4"27
.8559	72.4	4.45
.8597	72.9	4.11
1908.32	72.5	4.28

1434. Espin 51.

A and B. ($9^m 3$).

1907.807	308°4	67"72
.7867	308.5	68.05
.8559	308.3	67.75
1908.08	308.4	67.84

B and C. ($10^m 4$, $10^m 6$).

1907.807	257°3	2"34
.7867	256.4	2.44
.8559	257.5	2.20
1908.08	257.1	2.33

No other measures.

1539. H 2169. ($9^m 3$, $9^m 4$).

1908.785	311°3	7"93
.788	311.4	7.99
.804	311.7	7.91
1908.79	311.5	7.94

1583. Σ 6, App. I.

1908.671	163°07	81"20
.689	162.75	81.31
.692	162.95	80.93
.709	162.89	80.94
1908.69	162.91	81.09

No change.

1772. Σ 415.

1907.772	52°4	15"27
.8636	52.9	15.36
.8652	52.4	15.37
1908.35	52.6	15.33

No change since 1866. There is a 13^m star, $0^{\circ}6 : 37"4$.

1821. Σ 436.

1908.671	236°2	37"17
.692	236.1	37.35
.750	236.2	37.40
1908.70	236.2	37.31

No third star near enough for the micrometer.

1839. β 1041.

A and B.

1908.692	42°03	125"14
.728	41.85	125.36
.750	41.80	124.79
.766	41.80	125.11
1908.73	41.87	125.10

B and C.

1908.692	334°6	11"69
.750	334.7	11.97
.766	333.8	11.94
1908.74	334.4	11.87

The four sets of measures of BC (1888-1908) give for the proper motion of B $0^{\circ}232$ in $131^{\circ}2$.

The motion from meridian positions is too large.

1933. 43 Persei. S 440.

A and C. ($11^m 4$).

1908.843	133°28	102"24
.845	133.57	102.90
.862	132.88	102.66
1908.85	133.24	102.60

No other measures of this. The principal stars have a common proper motion.

2073. μ Persei. O Σ 73.

A and C.

1908.709	231°75	84"34
.711	231.62	84.14
.728	231.95	84.33
1908.72	231.77	84.27

The proper motion of the large star is small and uncertain:

Auwers $0^{\circ}028$ in $198^{\circ}5$

Newcomb 0.033 in 151.2 .

2103. O Σ (App.) 44.

1908.709	322°05	58"35
.711	322.00	58.29
.728	321.95	58.19
1908.72	322.00	58.28

No change.

2126. Σ 523.**A and B.**

1908.613	162°3	10°37
.633	162.9	10.36
.636	162.2	10.36
1908.63	162.5	10.36

A and C.

1908.613	48°23	108°49
.633	48.03	108.48
.636	48.20	108.38
1908.63	48.15	108.45

The only measure of the distant star is:

1893.03 48°13 109°11 2n Gla

2160. Σ 533.**A and B.**

1908.613	60°83	19°54
.633	60.45	19.50
1908.62	60.64	19.52

A and C. ($10^m 8$).

1908.597	191°33	109°66
.613	191.13	109.59
.633	191.13	109.89
1908.61	191.20	109.71

The only other measure of the distant star is:

1880.47 189°93 110°85 2n Bl

2163. 56 Persei $O\Sigma$ 81.

1908.652	36°3	4°32
.671	36.8	4.49
.689	38.0	4.42
.709	39.1	4.49
1908.68	37.5	4.43

There is retrograde motion in angle with no sensible change in the distance.

2166. Doolittle 7.**A and B.**

1908.671	212°0	46°71
.689	212.0	46.22
.750	211.9	46.82
1908.70	212.0	46.58

B and C.

1908.671	216°1	3°01
.750	218.4	2.57
1908.71	217.2	2.79

2210. Σ 548.**A and C.**

1908.597	195°23	121°29
.613	195.00	121.14
.633	195.03	121.28
1908.61	195.09	121.24

C and c. ($10^m 3$, $13^m 0$).

1908.597	52°3	16°67
.633	51.7	16.48
1908.61	52.0	16.58

The other measures of the distant star are:

1880.50 194°35 121°55 2n Bl
1893.02 194°34 121°03 2n Gla.

2220. 1 Camelop. Σ 550.**A and B.**

1908.597	307°0	10°22
.613	306.5	10.18
.633	307.5	10.16
1908.61	307.0	10.19

B and C. ($10^m 5$).

1908.597	215°38	149°78
.613	215.10	150.00
.633	214.97	149.90
1908.61	215.15	149.89

Earlier measures of the distant star are:

1879.48 214°58 150°17 2n Bl.

2239. 57 Persei. Sh 44.**A and B.**

1908.652	198°25	115°56
.671	198.52	115.48
.673	198.56	115.37
1908.67	198.44	115.47

B and C. ($12^m 5$).

1908.671	314°83	51°32
.692	314.13	51.44
1908.68	314.48	51.38

A and C.

1908.671	224°93	103°86
.692	224.45	103.52
1908.68	224.69	103.69

A and D. ($11^m 2$).

1908.671	353°87	76°41
.673	353.85	76.60
.692	354.23	76.22
1908.68	353.98	76.41

2269. Σ 570.

1908.709	259°8	12°84
.750	259.6	12.85
.824	259.3	12.78
1908.76	259.6	12.82

2558. Σ 629.

1907.807	6°7	15°70
8.636	7.8	16.01
8.652	6.7	15.74
1908.36	7.1	15.82

The proper motion of the principal star from the five positions by Σ , Δ , $O\Sigma$, A and β (1832-1908) is:

Measures 0°087 in 241°0
Greenwich 0.054 in 243.4.

2579. H 2253.**A and B. ($8^m 3$, $12^m 8$).**

1908.766	23°8	26°10
.769	23.4	26.30
.788	25.0	26.28
1908.77	24.1	26.23

A and C. ($9^m 6$).

1908.766	10°9	51°87
.769	10.6	52.00
.788	10.5	52.25
1908.77	10.7	52.04

2591. 14 Aurigae. Σ 653.**A and B.**

1908.766	352°7	11°19
.769	352.7	10.98
.788	353.8	11.10
1908.77	353.1	11.09

A and C.

1908.766	225°2	14°42
.769	224.4	14.50
.788	224.5	14.67
1908.77	224.7	14.53

A and D. ($10^m 3$).

1908.747	320°97	184°14
.766	320.78	183.97
.769	320.53	183.73
1908.76	320.76	183.95

The only prior observation of the distant star is:

1880.50 320°43 184°52 2n Bl.

According to Auwers the proper motion of the large star is nearly all in Decl.; while the measures of AB and

AD agree in placing it principally in RA. A continuation of these positions should give the real motion, which is certainly much larger than the meridian value.

Measures of AB $0^{\circ}040$ in $291^{\circ}6$
 , , AD 0.042 in 258.5
 Auwers 0.014 in 334.1 .

2627. λ Aurigae.

A and D.

1908.709	5.45	138.42
.711	5.60	138.35
.728	5.23	138.17
1908.72	5.43	138.31

A and C.

1908.769	236.5	34.17
.824	235.1	33.93
1908.80	235.8	34.05

My three sets of measures of the small star C (1879-1908) give, as they should do, practically the same value of the proper motion of the bright star:

AC $0^{\circ}852$ in $140^{\circ}8$
 AD 0.856 in 140.6 .

2660. See 50.

1907.022	220.0	31.32
8.159	221.6	31.77
8.750	221.7	32.16
1907.98	221.1	31.75

Unfortunately the original position of 1897 depends upon a single night, and therefore cannot be safely used with regard to relative motion. If this measure is correct, the large star has a proper motion of $1^{\circ}161$ in $106^{\circ}7$, which is more than three times the movement from meridian positions of $0^{\circ}356$. Another set of measures a few years hence will settle the matter. There is a third 14^m5 star about the same distance from A; BC = $99^{\circ}4 : 14^{\circ}$.

2680. $\Sigma 691$.

1908.747	300.2	25.66
.750	299.8	25.56
.766	300.0	25.47
1908.75	300.0	25.56

No measures since 1866.

2699. $\Sigma 698$.

1908.766	346.9	31.22
.824	346.4	31.09
.843	346.9	31.08
1908.81	346.7	31.13

Not fully measured since 1866.

2727. S 483.

A and B.

1907.848	50.82	96.02
8.025	50.38	96.01
8.044	50.50	95.96
1907.97	50.57	96.00

A and C.

1907.848	340.92	103.48
8.025	340.77	103.23
8.044	340.87	103.49
1907.97	340.85	103.40

A and D.

1907.848	318.63	108.42
8.025	318.77	108.33
8.044	319.10	108.93
1907.97	318.83	108.56

B and b. (13^m5).

1907.848	349.8	15.68
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The proper motion of A, derived from the several measures of B, C, and D, is as follows:

AB	RA. $-0^{\circ}051$	Decl. $-0^{\circ}194$
AC	-0.033	-0.207
AD	-0.057	-0.204
	-0.047	-0.202

Therefore the corrected movement of the principal star is:

$0^{\circ}207$ in $193^{\circ}1$.

2745. $\Sigma 711$.

B and C.

1908.613	245.50	190.73
.636	245.43	190.66
.671	245.40	190.50
1908.64	245.44	190.63

C and D. (10^m0 , 13^m1).

1908.636	305.6	15.48
.671	309.9	15.37
.689	307.6	15.38
.750	306.8	15.19
1908.69	307.5	15.35

The large common proper motion of

A and B is well known. Of the other stars the only prior measure is:

1881.46 $243^{\circ}00$ $197^{\circ}08$ 2n Bl.

The two positions give for the annual motion of AB:

$0^{\circ}386$ in $192^{\circ}3$.

Further measures are needed before this can be substituted for the meridian value.

The small star C is an exceedingly difficult and close pair. On only one night could it be seen well enough to properly measure.

C and a. (10^m5 , 10^m7).

1908.750	173.6	$0^{\circ}59$
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3130. $\Sigma 831$.

1908.636	75.7	11.76
.652	75.7	11.88
.671	75.4	11.77
1908.65	75.6	11.80

No recent measures.

3238. $\Sigma 872$.

A and B.

1908.766	217.5	11.19
.788	217.0	11.41
.804	216.8	11.21
1908.79	217.1	11.27

A and C. (11^m0).

1908.766	284.20	203.35
.788	284.10	203.59
.826	284.02	203.93
1908.79	284.11	203.62

The only other measure of the distant small star is:

1879.53 $286^{\circ}88$ $201^{\circ}03$ 2n Bl.

A comparison of this with the recent measures implies a proper motion of A much larger than that given by meridian positions:

Measures $0^{\circ}346$ in $30^{\circ}3$
 Auwers 0.076 in 270.0 .

It is possible that we have here an excessively rare example of a small star with a sensible proper motion, of which only a few instances are known in the entire heavens. It is not probable that there is any very large error in the old value, considering the magnitude of the principal star; and still less probable that the faint comparison star is moving

at all. Therefore, the explanation must be first looked for in errors of the micrometer positions.

It may be suggested that the first measures belong not to AC, but to BC. In that case my measures reduced to BC would stand, $287^{\circ}11' : 199^{\circ}32'$, which would still leave too large a change.

To show hereafter whether there is really any motion in C, I have connected a third star:

C and D. (11^m2 , 11^m1).

1908.788	164.10	120.53
.826	163.80	120.21
.843	164.15	120.17
1908.82	164.02	120.30

3267. $\Sigma 878$.

A and B.

1908.747	330.10	23.77
.788	330.75	23.89
.804	331.63	23.87
1908.78	330.83	23.84

A and C. (11^m2).

1908.747	68.10	114.80
.788	67.95	114.72
.804	67.85	114.98
1908.78	67.97	114.83

The other measures of AC are too discordant to be used for the proper motion of A:

1880.22	69.23	113.57	in Bl
1880.74	68.32	112.07	in Bl.

3277. 4 Lyncis. $\Sigma 881$.

AB and C. (11^m0).

1908.747	356.00	100.00
.788	356.05	100.22
.804	356.38	100.14
.843	356.25	100.14
1908.80	356.17	100.12

The previous measures are:

1879.25	355.88	101.14	in Bl
1879.71	355.68	100.38	in Bl

There is a faint star near the close pair, not previously observed:

AB and a. (12^m9).

1908.788	96.3	26.37
.824	96.3	26.45
.826	95.9	25.47
.843	97.2	26.26
1908.82	96.4	26.14

3521. $H\Sigma$.

1907.675	281.9	0.77
.7694	275.2	0.70
.8709	276.4	0.78
1908.02	277.8	0.75

3600. $\Sigma 960$.

1908.747	66.7	21.79
.788	66.8	21.90
.824	68.2	21.80
1908.79	67.2	21.83

No measures since 1867.

3606. $\Sigma 962$.

1907.807	242.1	26.00
.8671	242.4	25.80
.8692	242.2	26.10
1908.39	242.2	25.97

No late measures.

3627. Espin 67. (8^m7 , 10^m0).

1907.807	307.8	5.78
.8063	309.3	5.91
.8671	310.0	5.91
1908.18	309.0	5.87

3653. 59 Aurigae. $\Sigma 974$.

A and B.

1908.636	223.9	22.34
.652	224.0	22.43
.671	223.3	22.40
1908.65	223.7	22.39

B and C. (13^m3).

1908.689	217.5	25.78
.824	219.3	25.74
.843	219.8	26.01
1908.79	218.9	25.84

No late measures of AB, and no other measures of the faint star.

3685. $\Sigma 978$.

1908.728	90.45	16.42
.747	90.55	16.84
.766	89.43	16.82
1908.75	90.14	16.70

The measures of Σ , Δ and β give for the true proper motion of the principal star:

$0^{\circ}039$ in $222^{\circ}5$.

3873. $\Sigma 1032$.

A and C. (9^m0).

1908.826	319.15	132.55
.843	319.24	132.11
.845	319.47	132.79
.862	318.98	132.06
1908.84	319.21	132.38

For comparison we have:

1879.1	318.6	133.1	AG Bonn
1880.52	318.83	132.98	2n Bl.

3906. $\Sigma 1042$.

A and B.

1907.788	40.8	11.84
.7791	40.5	11.87
.8063	41.6	12.20
.8689	41.2	12.00
1908.08	41.0	11.98

A and C. (13^m5).

1907.791	78.5	24.21
.8785	80.0	24.49
.8788	77.7	24.37
1908.45	78.7	24.36

No measures of AB since 1867. The faint star has not been previously observed. The principal star is BD $+42^{\circ}1686$. The brighter star BD $+42^{\circ}1685$ is in the field.

3908. $\Sigma 1039$.

A and B.

1908.769	207.3	3.14
.785	210.3	3.01
.788	208.6	3.09
1908.78	208.7	3.08

A and C. (8^m5).

1908.769	310.83	127.58
.785	311.27	127.54
.788	310.80	127.67
1908.78	310.97	127.60

No measures of AB since 1869. C is BD $+64^{\circ}699$.

1880.56 $311^{\circ}35$ $127^{\circ}22$ 2n Bl.

3909. $\Sigma 1047$.

B and C. (11^m4).

1908.769	297.41	35.91
.788	297.80	35.83
.843	298.25	35.73
1908.80	297.82	35.82

The principal star appears to have a small proper motion. The measures of

the third star will show whether or not B has any movement.

3943. $\Sigma 1050$.

A and B.

1908.788	20°15	19°33
.804	20.13	19.33
.843	19.30	19.36
1908.81	19.86	19.34

A and C. (11^m5).

1908.785	226°13	197°30
.788	225.77	197.40
.843	225.97	197.48
1908.81	225.96	197.39

The prior measure is on a single night only, and change is doubtful. It should be remeasured later.

1880.28 225°48 199°38 in Bl.

3944. $\Sigma 1054$.

A and B.

1908.766	291°9	18°72
.785	291.4	18.53
.788	292.1	18.64
1908.78	291.8	18.63

B and C. (9^m2).

1908.766	267°90	79°40
.785	268.03	79.26
.788	267.95	79.80
1908.78	267.96	79.49

No change in AB, and probably none in the other.

1880.54 267°15 79°83 2n Bl.

3973. 19 Lyncis. $\Sigma 1062$.

B and C. (11^m0).

1908.766	287°03	74°20
.769	287.46	74.52
.788	287.60	74.31
1908.77	287.36	74.34

The only other measures of this are uncertain in distance and angle:

1879.33 288°45 73°70 in Bl
1879.78 286.07 74.72 in Bl.

4130. $O\Sigma 175$.

AB and C. (10^m0).

1908.689	194°70	81°55
.709	194.85	81.53
.728	194.18	81.46
1908.71	194.58	81.51

The only other measures are those by Glasenapp.

4159. $O\Sigma$ (App.) 87.

1908.804	178°38	64°39
.826	178.63	64.50
.846	178.78	64.14
1908.83	178.60	64.34

Distance apparently decreasing.

4286. $O\Sigma$ (App.) 89.

1908.102	82°98	76°69
.326	82.68	76.84
.689	82.78	76.79
1908.37	82.81	76.77

No change.

4618. H 2445. (8^m5 , 12^m9).

1907.140	158°1	44°22
8.063	157.7	43.74
8.788	158.2	43.72
1908.00	158.0	43.89

No other measures.

4923. σ^2 Ursae maj. $\Sigma 1306$.

A and C. (9^m4).

1908.766	148°10	205°13
.769	149.83	205.04
.788	148.23	204.76
1908.77	148.72	204.98

The following is corrected for error of 180° in the angle:

1879.55 147°97 206°31 2n Bl.

5104. 23 Ursae maj. $\Sigma 1351$.

A and C. (10^m5).

1908.766	227°94	93°51
.769	227.88	93.26
.788	228.40	93.07
.826	227.65	93.34
1908.79	227.97	93.29

Prior measures for comparison are:

1886.39 227°33 90°60 in Eng.
1894.40 227.87 92.32 in Eng.

The three positions give for the proper motion of 23 Ursae maj.:

$0^{\circ}105$ in $65^\circ5$.

Bl has two measures in 1879, but as the distances differ by more than $1''$, they are not used in the computation.

6512. $O\Sigma 268$ rej.

A and B.

1908.249	75°2	19°25
.266	76.5	18.95
.383	75.9	19.81
1908.30	75.9	19.34

A and C.

1908.249	258°42	69°83
.266	258.18	69.81
.271	258.50	69.89
1908.26	258.37	69.84

A and D. (12^m2).

1908.249	29°38	84°82
.266	29.35	84.44
.383	29.85	84.62
1908.30	29.53	84.63

From five positions of AC (1876 to 1908), each on three or more nights, the apparent motion of the principal star is: $0^{\circ}080$ in $55^\circ5$.

A continuation of the measures of AB and AD will show whether or not there is any motion in C.

6611. S 652.

A and B.

1908.156	134°58	49°02
.192	134.38	49.12
.370	134.80	49.01
1908.24	134.59	49.05

The four positions given, including South in 1829, make the apparent motion of B:

$0^{\circ}153$ in $27^\circ0$.

It is obvious from the magnitudes, this proper motion may be in either, or both. I have therefore connected a third star:

A and C. (9^m9).

1908.156	339°78	114°04
.370	340.02	113.99
1908.26	339.90	114.01

6881. $\Sigma 1847$.

1907.258	261°8	25°95
7.348	261.8	26.13
8.192	262.8	25.88
1907.60	262.1	25.99

A and BD $-9^\circ3950$

1907.258 Δ Decl. = $190^\circ80$.

7120. 44 Bootis. Σ 1909.		
1908.271	243.8	4.21
.370	244.8	4.19
.383	243.4	4.20
.403	241.7	4.23
1908.36	243.4	4.21

7277. Σ 1945.

A and B.

1908.249	292.8	32.47
.288	292.6	33.00
.331	292.7	32.42
1908.29	292.7	32.63

B and C.

1908.249	281.4	8.84
.288	281.4	9.04
.331	282.9	9.06
1908.29	281.9	8.98

A and E. (10^m 7).

1908.249	54.15	146.22
.288	54.15	146.26
1908.27	54.15	146.24

7302. β 945.

1908.425	44.5	15.80
.444	44.3	15.66
.460	45.9	15.81
1908.44	44.9	15.76

The seven positions by β , A and Doo (1879-1908) give for the corrected proper motion of the principal star:

0.302 in 301.4.

7341. Σ 1963.

A and B.

1908.252	294.2	4.70
.266	294.3	4.80
.288	294.1	4.67
1908.27	294.2	4.72

A and C. (12^m 5).

1908.266	116.28	31.12
.288	115.75	30.89
.370	115.70	31.01
1908.31	115.91	31.01

No other measures of the small star.

7411. H 574. (9^m 0, 11^m 8).

A and B.

1908.249	93.0	15.95
.266	92.4	15.97
.425	93.4	15.97
1908.31	92.9	15.96

A and C. (10^m 0).

1908.249	99.35	77.52
.266	99.05	77.44
.425	99.78	76.84
1908.31	99.39	77.27

No other measures.

7422. Σ 1983.

1908.291	71.0	15.75
.370	71.9	15.75
.383	71.9	16.18
1908.35	71.6	15.89

The four positions by Σ , A and β (1830-1908) give for the proper motion of A:

0.027 in 117.1.

7500. Σ 2007.

A and B.

1908.288	325.4	34.80
.331	324.9	35.09
.425	325.5	34.65
1908.35	325.3	34.85

A and C. (9^m 8).

1908.288	137.68	167.88
.331	137.40	167.61
.422	137.70	167.62
1908.35	137.59	167.70

One of the Σ components has a small proper motion, and it is impossible to say which it is. I have, therefore, connected a third small star, which is BD +13°3066. Remeasuring this after a proper interval will show what the fact is.

7563. σ Coronae bor. Σ 2032.

A and D.

1908.288	86.08	63.16
.331	85.80	63.34
.370	85.78	63.40
.383	85.73	63.28
1908.34	85.85	63.29

The seven sets of measures of this small star by Σ , A, Je, Do and β (1836 to 1908) should give a more accurate value of the proper motion of the principal star than that found by meridian observations. From the micrometer we have:

0.276 in 258.5.

7756. Espin 76. (9^m 7, 9^m 9).

1907.351	44.0	2.77
8.425	44.0	1.97
8.444	46.6	2.40
1908.07	44.9	2.38

7864. H 2804. (9^m 8, 10^m 1).

1907.331	276.4	14.74
8.370	277.1	14.41
8.422	277.1	14.57
1908.04	276.9	14.57

There seems to be no doubt of change in angle and distance. They are not given in BD.

7872. Σ 2128.

1907.331	50.0	11.91
7.351	49.9	11.84
8.370	51.2	11.91
1907.68	50.4	11.89

7893. Σ 2131.

1908.288	179.1	24.38
.331	178.5	24.30
.370	178.9	24.29
1908.33	178.8	24.32

No change in angle or distance.

7942. Σ 2147.

1908.288	93.1	6.22
.331	91.8	6.16
.370	93.7	6.25
1908.33	92.9	6.21

8015. Σ 2167 rej. (8^m 1, 10^m 7).

1907.351	222.8	18.24
8.422	223.1	18.56
8.425	223.0	18.67
1908.07	223.0	18.49

8032. Σ 2169.

1908.252	97.6	14.79
.556	97.8	15.06
.559	98.9	14.93
1908.46	98.1	14.93

No change.

8099. 26 Draconis. β 962.

1908.518	351.5	1.06
.575	353.0	1.21
.597	348.5	1.16
1908.56	351.0	1.14

8182. ψ Draconis. Σ 2241.

A and B.		
1908.370	15°45	30°54
.383	15.88	30.50
.403	15.43	30.55
1908.39	15.59	30.53

A and C.		
1908.252	121°60	92°46
.288	122.00	92.28
.331	121.27	92.02
.370	122.00	92.55
1908.31	121.72	92.33

The proper motion of A as deduced from the five measures (1857-1908) of the small star C should be more accurate than that from any other data:

0°283 in 176°15.

Some of the former results from meridian positions are:

Newcomb 0°268 in 178°4

Greenwich 0.279 in 177.8.

I have measured a small star from C. When these stars are remeasured hereafter, it is practically certain that there will be no change.

C and D. (12 ^m 0).		
1908.370	19°13	67°37
.383	19.05	67.45
.403	18.75	67.93
1908.39	18.98	67.58

8197. Σ 2233.

A and C. (13 ^m 6).		
1907.597	141°1	22°54
8.331	140.3	22.79
8.482	141.3	22.81
1908.14	140.9	22.71

A and D. (13 ^m 2).		
1907.597	236°0	30°20
8.331	235.2	30.83
8.482	236.3	30.53
1908.14	235.8	30.52

The only other measures are by Lewis in 1905.

8316. Ho 564.

A and B.		
1908.331	324°4	31°23
.422	326.1	31.94
.537	324.2	31.30
1908.43	324.9	31.49

A and C. (10^m9).

1908.252	64°50	82°80
.331	64.00	82.70
.422	64.53	83.13
1908.33	64.34	82.88

In the General Catalogue, the distance of AB by Doolittle in 1902 should read 27°82 instead of 24°82. No other measures of AC.

8404. Σ 2291.

1907.348	339°7	27°11
7.351	339.6	27.17
8.479	340.0	26.95
1907.73	339.8	27.08

Distance increasing.

8440. Σ 2298.

A and B.		
1908.422	179°2	2°17
.425	179.4	2.06
1908.42	179.3	2.11

A and C. (10 ^m 9).		
1908.403	40°30	77°35
.422	40.22	77.29
.425	40.02	77.32
1908.42	40.18	77.32

The prior measures of C are discordant in distance and further observations are required.

1881.29	39°42	77°53	1n Bl
1881.77	40.08	78.47	1n Bl.

8482. Σ 2305.

A and C. (10 ^m 6).		
1908.403	197°22	100°39
.422	196.95	100.76
.425	197.18	100.76
1908.42	197.12	100.64

The only other measures are:

1880.58	197°60	102°02	2n Bl.
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If this distance was right, A should have a proper motion of 0°058 in 229°1. The measures should be repeated after a few years.

8485. Σ 2303.

1908.594	224°1	2°76
.597	227.5	2.53
.613	227.8	2.54
1908.60	226.5	2.61

Very little, if any, change.

8579. Σ 2319.

A and C. (10 ^m 0).		
1908.288	274°4	39°61
.444	274.5	39.72
.460	274.4	39.95
1908.40	274.4	39.76

The measures of the small star furnish data for a very accurate value of the proper motion of A. The measures of Σ , α and β (1829-1908) give:

Measures 0°043 in 30°0
AG Berlin A 0.045 in 51.7.

8615. Σ 2329.

1908.597	43°6	4°06
.613	44.7	4.20
.633	45.6	4.25
1908.61	44.6	4.17

No change in angle or distance since 1830.

8732. Σ 2368.

A and C.		
1908.370	124°98	36°84
.460	124.33	36.63
.463	125.18	36.69
1908.43	124.83	36.72

Evidently a large error in the first measure of this.

8822. Σ 2397.

1907.542	266°6	3°98
8.520	267.7	3.94
8.537	267.7	4.25
1908.20	267.3	4.06

8923. Ho 270.

A and B. (5 ^m 6, 14 ^m 5).		
1907.465	306°0	8°31
8.520	306.7	8.48
1907.99	306.3	8.39

A and C.		
1907.348	39°8	23°49
7.465	40.2	23.68
8.520	39.1	23.69
1907.78	39.7	23.62

8932. Σ 3130.

A and C. (10 ^m 6).		
1908.460	311°30	180°97
.463	311.40	180.90
.479	311.23	181.29
1908.47	311.31	181.05

The large star appears to have no sensible proper motion

1880.58 311°65 181°26 2n Bl.

9000. Σ 2441.

A and C. (10^m7).

1908.444	140°97	96°53
.460	141.45	96.20
.479	141.23	96.59
1908.46	141.22	96.44

If there is any proper motion in Σ 2441, it is evidently very small

1880.54 141°24 96°10 2n Bl.

9186. θ Lyrae. Sh 292.

A and B.

1908.463	70°92	99°99
.479	71.10	99.48
.518	70.83	99.83
1908.49	70.95	99.77

A and C. (11^m5).

1908.463	127°90	100°71
.479	127.97	100.99
.518	127.35	100.45
1908.49	127.74	100.72

The only other measures of C are:

1879.76 127°02 99°18 1n Bl
1880.25 127.62 99.91 1n Bl.

9294. 4 Vulpeculae. H 2871.

A and B.

1908.444	104°85	23°65
.460	106.30	23.91
.479	105.48	24.10
.482	105.83	24.50
1908.47	105.61	24.04

A and C. (11^m7).

1908.460	198°83	53°91
.479	198.87	53.79
.482	198.68	54.16
1908.47	198.79	53.95

No other measures of C. The six positions of AB, including my measures of 1907, give for the proper motion of 4 Vulpeculae:

0°113 in 130°8.

9304. H 1395. (8^m8, 8^m8).

1907.542	66°1	2°71
8.444	65.1	2.67
8.520	64.4	2.70
1908.17	65.2	2.69

9308 Σ 2521.

A and B.

1908.444	37°97	24°90
.460	37.87	24.95
.479	38.67	24.98
1908.46	38.17	24.94

A and C. (9^m5).

1908.444	322°40	70°14
.460	322.53	70.37
.479	322.60	70.06
1908.46	322.51	70.19

A and D. (9^m5).

1908.444	63°83	149°72
.460	64.03	149.51
.479	64.10	149.59
1908.46	63.99	149.61

The proper motion of the principal star (Bradley 2462) as given from meridian observations seems to be certainly wrong in amount and direction:

Auwers 0°075 in 237°8

AG Berlin A 0.074 in 223.3.

The five sets of measures of AB by Σ , Δ , Per and β (1829-1908) give for this motion:

0°041 in 178°4.

This is confirmed by the measures of AD which give:

0°043 in 161°2.

The only prior position of this star is:

1878.61 64°48 149°46 3n Bl

Of AC there is only a single measure, and later observations should be made of both.

There is a 14^m star about the same distance as B from A, 73°5:25°0.

9317. β 1286.

A and B.

1907.523	104°7	6°16
7.542	105.7	6.51
8.370	103.6	6.19
8.482	102.9	6.12
1907.98	104.2	6.24

B and C.

1908.482	145°6	0°98
.520	141.4	0.90
1908.50	143.5	0.94

A and D.

1908.518	38°7	37°53
.520	38.3	37.32
.537	38.5	37.92
1908.52	38.5	37.59

B and D.

1908.518	28°9	35°51
.520	28.6	35.16
.537	29.5	35.72
1908.52	29.0	35.46

Further measures are needed to determine the true relation of these stars.

9399. $O\Sigma$ 374 rej.

1907.542	296°8	18°62
8.370	296.5	18.77
8.444	296.9	18.77
1908.12	296.7	18.72

The proper motion of the large star is given in Groombridge:

0°039 in 98°8.

9404. μ Aquilae. β 653.

A and B.

1908.460	280°03	29°34
.482	280.40	29.20
.518	279.92	29.14
1908.49	280.12	29.23

A and C.

1908.460	292°35	28°86
.482	292.00	29.32
.518	291.00	29.02
1908.49	291.78	29.07

A and D.

1908.460	345°75	63°06
.482	345.57	63.04
.518	345.48	62.91
1908.49	345.60	63.00

A and E.

1908.460	70°30	179°43
.482	70.30	179.74
.518	70.35	179.51
1908.49	70.32	179.56

From the measures of the several companion stars, we have the following for the movement of A:

AB	RA. +0°250	Decl. -0°110
AC	+0.227	-0.166
AD	+0.238	-0.111
AE	+0.244	-0.167
	+0.240	-0.138

Therefore the true proper motion of μ Aquilae is:

$0^{\circ}.277$ in $119^{\circ}.9$.

9438. Espin 129.

A and B. ($9^m.4$, $10^m.3$).

1908.266	221.5	3.29
.331	224.9	3.26
.370	226.3	3.52
1908.32	224.2	3.36

A and BD $+52^{\circ}.2458$.

1908.266	273.15	71.77
.331	273.22	71.86
.370	273.52	71.86
1908.32	273.30	71.83

There is an error of 1° in the declination given by Espin. It should be $+52^{\circ}.33'$. The principal star is BD $+52^{\circ}.2459$.

9607. Σ 2578.

A and C. ($12^m.0$).

1908.463	357.53	45.45
.479	357.60	45.42
.482	357.87	45.61
1908.47	357.67	45.49

The only other measures are those given in G.C. by Glasenapp.

A and D. ($9^m.5$).

1908.463	251.28	143.35
.479	251.20	143.35
.482	251.30	143.26
1908.47	251.26	143.32

Of this we have:

1880.10 $251^{\circ}.32$ $142^{\circ}.85$ 2n Bl

The apparent change in the distances of both stars requires confirmation.

There is a 14 magnitude star near C, $75^{\circ}.0$: $11^{\circ}.6$.

9756. Σ 2602.

1908.537	148.3	12.27
.559	148.7	12.30
.573	148.4	12.38
1908.56	148.5	12.32

Struve's place of Σ 2602 in Pos. Med. belongs to another star $2^m.40^s$ f, BD $-13^{\circ}.5537$. While Σ 2602 is No. 5522. The place in Part I should be:

RA. = $19^h 49^m 34^s$
Decl. = $-13^{\circ} 40'$.

It is a coincidence worth mentioning that the star given in Pos. Med. is a pair very much like the other except in magnitudes.

A and B. ($9^m.0$, $13^m.0$).

1908.537	156.5	14.72
.573	158.0	14.77
.575	158.5	14.87
1908.56	157.7	14.79

A and BD $-13^{\circ}.5536$.

1908.520	192.23	131.64
.537	192.40	131.89
.559	192.47	131.42
1908.54	192.37	131.65

It is evident that neither of these stars has any proper motion:

1864.77 $192^{\circ}.05$ $131^{\circ}.26$ in Δ .

9765. ψ Cygni. Σ 2605.

A and C. ($13^m.8$).

1908.425	55.6	18.65
.444	54.0	19.11
.460	54.3	18.76
1908.44	54.6	18.84

This faint companion has not been previously seen.

A and D. ($10^m.4$).

1908.422	61.38	165.24
.425	61.30	165.21
.444	61.30	165.64
1908.43	61.33	165.36

Of the distant star we have:

1880.14 $61^{\circ}.50$ $163^{\circ}.20$ 2n Bl

The two positions give for the apparent motion of A:

$0^{\circ}.078$ in $229^{\circ}.0$.

Further measures are required to improve the value previously given.

9863. Σ 2622.

A and C. ($10^m.5$).

1908.520	308.1	17.18
.537	308.8	16.95
.559	308.9	17.35
1908.54	308.6	17.16

9965. H 2936. ($8^m.8$, $9^m.1$).

1908.575	252.0	12.53
.633	252.1	12.60
.636	252.0	12.73
1908.61	252.0	12.62

No other measures.

9997. Espin 132.

* A and B. ($8^m.8$, $9^m.0$).

1907.638	82.4	5.45
8.252	83.5	5.79
8.370	81.3	5.51
1908.09	82.4	5.58

A and C. ($8^m.6$).

1907.638	60.5	37.70
8.252	59.9	37.79
8.370	60.6	37.53
1908.09	60.3	37.67

B and C.

1907.638	57.0	32.50
8.252	56.4	32.65
8.370	57.0	32.49
1908.09	56.8	32.55

10061. A.G. 251.

1908.575	185.4	7.20
.597	185.0	7.25
.633	186.0	7.30
1908.60	185.5	7.25

10100. Σ 2666.

A and C.

1908.537	207.6	34.22
.556	208.0	34.30
.559	206.8	34.44
1908.55	207.5	34.32

The distance by T is too small.

1894.59 $207^{\circ}.4$ $34^{\circ}.27$ 2n Gla.

10104. ν Capricorni.

1908.537	209.78	53.90
.573	210.25	54.24
.575	209.80	54.22
.594	210.18	53.61
1908.57	210.00	53.99

10171. H 1510.

A and B. ($8^m.5$, $8^m.8$).

1908.573	150.2	4.65
.575	150.4	4.51
.594	149.9	4.52
1908.58	150.2	4.56

A and C. ($12^m.6$).

1908.573	341.7	6.70
.575	342.2	6.53
.594	343.0	6.46
1908.58	342.3	6.56

A and D. ($11^m.2$).

1908.573	323.3	31.32
.575	322.3	31.24
.594	322.1	31.08
1908.58	322.6	31.21

10180. $O\Sigma$ (App.) 207.

A and C.

1908.537	63.33	94.02
.556	63.32	94.00
.573	63.43	93.73
1908.56	63.36	93.92

In Part II p. 1082, in the proper motion of A for 19086 read 0.086.

The four sets of measures of C now available (1876-1908) give for this motion: 0.083 in $53^\circ 6'$.

While C is a bright star, there is no reason for supposing that it has any sensible proper motion. For greater certainty, I have measured the faint star D.

C and D. ($13^m.3$).

1908.537	162.24	57.51
.556	164.37	57.60
.573	163.80	57.20
1908.56	163.47	57.44

10183. Lewis 34. ($10^m.4$, $10^m.6$).

1908.537	174.9	4.40
.556	175.9	4.44
.573	173.8	4.43
1908.56	174.9	4.42

These stars, too faint to be in BD, are about $6'$ n of the $8^m.7$ star, BD +42°37'25". This does not agree with the description by Lewis in magnitudes, or distance which is given as $1'55''$. As nothing else could be found in this vicinity, there must be a large error in the place, or in the measures.

10194. β 1134.

1907.463	80.0	4.23
8.482	80.0	4.09
8.520	80.6	4.34
1908.15	80.2	4.22

The only other measures are my own in 1889.

10216. S 749.

A and C.

1908.441	316.52	43.56
.479	316.43	43.55
.482	316.48	43.67
.518	316.02	43.73
1908.48	316.36	43.63

C and D. ($10^m.6$, $10^m.7$).

1908.441	240.25	77.35
.482	240.50	77.23
.518	239.42	77.06
1908.48	240.06	77.21

There is a $13^m.5$ star near C, 197°5 : 19°8.

A and D.

1908.479	266.23	97.59
.482	266.33	97.44
.518	266.55	97.11
1908.49	266.37	97.38

D and d. ($13^m.6$).

1908.479	21.7	5.78
.482	21.5	5.78
.518	19.1	5.80
1908.49	20.8	5.79

We have the following of two of these stars:

AC 1891.79 $314^\circ 02'$ $44^\circ 87'$ 2 n Eng.
AD 1891.79 266.25 100.37 1 n Eng.

If the measures had been made on a greater number of nights, the result of a comparison with the present measures would be more accurate.

AC	RA. —0.130	Decl. —0.024
AD	—0.178	—0.024
	—0.154	—0.024

Hence the most probable proper motion of A is:

0.156 in $261^\circ 1'$.

10289. β 668.

A and C.

1908.633	198.23	100.05
.636	198.40	100.11
.652	198.00	100.54
.671	198.30	100.00
1908.65	198.23	100.18

These measures of the $10^m.4$ star are made in the interest of the large proper motion of AB.

10325. H 1535.

A and B.

1908.537	247.4	16.92
.573	246.3	16.77
.575	246.8	17.09
1908.56	246.8	16.93

A and C.

1908.537	153.2	18.54
.573	154.1	18.62
.575	154.2	18.65
1908.56	153.8	18.60

The proper motion given A seems to be doubtful, at least in amount. The distance of B should have increased about $1''$ since 1902.

10383. Hn 39.

1908.520	176.0	7.62
.537	175.2	7.61
.559	177.4	7.93
1908.54	176.2	7.72

10390. α Delphini. $O\Sigma$ 533.

1908.671	300.6	17.50
.673	300.3	17.43
.689	301.6	17.46
.692	300.2	17.53
1908.68	300.67	17.48

10426. Σ 2717.A and C. ($9^m.7$).

1908.633	52.83	45.90
.636	53.20	45.65
.652	52.83	45.67
1908.64	52.95	45.74

10447. Σ 2718.

A and B.

1908.671	86.5	8.45
.673	86.9	8.46
.689	86.1	8.95
1908.68	86.5	8.62

A and C.

1908.671	345.70	166.99
.689	345.38	167.07
.692	345.36	167.09
1908.68	345.48	167.05

10459. β 674.

1907.788	102.9	1.48
7.807	103.8	1.70
8.573	102.7	1.45
1908.06	103.1	1.54

10512. ϵ Cygni. β 676.

1908.652	298.63	40.88
.655	298.18	41.09
.671	298.25	40.74
.673	298.62	40.69
1908.66	298.42	40.85

The proper motion of ϵ Cygni from nine sets of complete measures (1852 to 1908) is:

0.504 in 48.7.

10525. Hn 41.

A and C.

1908.655	260.9	8.26
.671	262.4	8.14
.673	261.4	8.01
1908.67	261.6	8.14

A and B.

1908.671	235.1	3.55
.673	236.4	3.63
1908.67	235.7	3.59

10526. H 2998.

A and B. (9^m5 , 9^m6).

1907.695	141.4	5.80
8.573	140.4	6.18
8.633	141.7	6.09
1908.30	141.2	6.02

A and C. (10^m6).

1908.633	133.23	99.17
.636	133.07	99.04
1908.63	133.15	99.10

The principal star is BD — 21°5839 (8^m7). There is no relative change. To determine whether or not the alleged large proper motion is real, I have connected a third small star.

10546. ι 5 Delphini.

A and C. (10^m5).

1908.383	81.98	108.04
.422	81.70	107.96
.425	81.93	108.11
1908.41	81.87	108.04

The prior measures are:

1886.93 81.15 109.34 2n Eng
1894.36 81.39 108.64 2n Eng

The proper motion of the principal star is:

Measures 0.078 in 34.4
Paris 0.122 in 31.0
Porter 0.113 in 26.0.

10727. β 157.

A and C.

1908.594	67.0	10.05
.636	66.1	9.76
.671	67.3	10.16
.673	67.1	10.03
1908.64	66.9	10.00

10747. β 680.

AB and C.

1908.597	33.4	22.75
.636	33.2	22.85
.652	33.1	22.78
1908.63	33.2	22.79

10775. Σ 2763.

1907.559	293.7	17.22
.578	293.0	17.06
.581	293.0	17.30
1907.57	293.2	17.19

10835. Σ 2779.

A and B.

1908.594	180.43	17.11
.597	180.88	17.18
.633	179.97	17.10
1908.61	180.43	17.13

As it is uncertain which of the Struve components is moving, I have connected with a third small star.

A and C. (12^m0).

1908.594	66.05	58.30
.597	66.75	58.19
.633	66.37	58.38
1908.61	66.39	58.29

10846. τ Cygni.

A and D.

1908.520	210.66	162.60
.556	210.67	162.83
.559	210.57	162.44
1908.54	210.63	162.62

With the five positions by $O\Sigma$ (1851 to 1908), we have for the proper motion of τ Cygni:

0.475 in 17.8.

10847. H 1628. (9^m4 , 9^m6).

1907.581	252.0	15.13
7.636	253.2	15.30
8.520	253.4	15.30
1907.91	252.9	15.24

10880. β 163.

AB and C. (13^m6).

1908.556	242.07	28.94
.573	242.00	28.92
1908.56	242.03	28.93

AB and D. (13^m0).

1908.556	160.97	50.08
.573	160.60	50.22
1908.56	160.78	50.15

No other measures of these faint stars.

AB and E.

1908.520	9.07	82.76
.556	9.04	83.06
.559	8.87	82.67
.573	9.20	83.15
1908.55	9.04	82.91

10917. H 281.

1908.597	335.48	14.11
.633	335.50	14.02
.636	334.70	13.90
1908.62	335.23	14.01

10920. Σ 2787.

A and B.

1908.594	20.22	22.72
.597	20.32	22.53
.633	20.17	22.68
1908.61	20.24	22.64

A and C.

1908.594	94.83	70.13
.597	95.22	69.91
.633	95.23	70.41
1908.61	95.09	70.15

Distance of C larger in first measure.

11032. Σ 2803.

1908.594	287.58	24.33
.597	288.19	24.55
.633	287.53	24.40
1908.61	287.77	24.43

11128. Espin 102. (8^m1 , 10^m8).

1908.575	36.0	11.47
.597	37.7	11.30
.613	35.3	11.39
1908.59	36.3	11.39

11147. Espin 140. ($8^m 0$, 13^m).

A and C.

1908.575	331.7	11.63
.597	332.0	11.66
.613	331.6	11.53

1908.59	331.8	11.61
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A and B. ($14^m 2$).

1908.613	182.3	6.57
.636	183.5	6.62

1908.62	182.9	6.60
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The very faint companion, B, was detected by Mr. *Oliver T. Lee* of this observatory.

11152. Ho 464.

1908.636	104.4	17.54
.652	103.6	17.79
.671	104.3	17.85

1908.65	104.1	17.73
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The following measure not given in G.C.:

1906.62 $103^{\circ}9$ $17^{\circ}55$ 3n Doo.11172. H 3050. ($9^m 5$, $10^m 6$).

1908.633	46.1	23.17
.636	46.7	23.10
.652	46.0	23.38

1908.64	46.3	23.22
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The distance in the prior measure is much too large.

11235. $O\Sigma$ (App.) 224.

1908.709	5.50	58.53
.711	5.47	58.50
.731	5.51	58.56

1908.72	5.49	58.53
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11303. Σ 2834.

A and B.

1908.575	293.5	4.33
.594	293.6	4.40
.613	293.7	4.44

1908.59	293.6	4.39
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A and C. ($13^m 0$).

1908.575	121.0	26.14
.594	121.1	25.83
.613	121.1	26.19

1908.59	121.1	26.05
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There may be a slight increase in angle and distance. No other measures of C.

11305. H 5298. ($9^m 5$, $10^m 2$).

1908.636	312.4	60.76
.671	312.3	60.17
.673	312.2	60.43

1908.66	312.3	60.45
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There is a $13^m 5$ star between the two, nearer A.

11355. Battermann.

A and B.

1908.537	162.5	1.54
.556	162.8	1.54
.573	162.9	1.56

1908.56	162.7	1.55
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A and C.

1908.556	302.2	22.83
.573	300.2	22.87
1908.56	301.2	22.85

A and B have the same proper motion, while C is fixed in space.

11364. $O\Sigma$ 454.

A and C.

1908.594	264.88	43.24
.597	265.03	43.20
.633	264.50	43.06

1908.61	264.80	43.17
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No change since 1895.

11396. Sh 336.

A and B.

1908.769	224.25	99.88
.788	224.47	99.77
.804	224.97	100.11

1908.79	224.56	99.92
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One of these stars has a proper motion in declination of about $0''.10$. Both are given in some of the catalogues:

1825	225.2	103.7	Weisse
1885	224.6	102.1	AG Leipz. II

To determine which is moving, I have connected a third 12^m star:

A and C.

1908.785	102.23	85.31
.788	101.15	85.24
.824	102.33	85.42
1908.80	101.90	85.32

11428. 20 Pegasi. H 289.

1908.537	324.90	52.93
.556	324.82	53.30
.559	324.74	53.07

1908.55	324.82	53.10
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The three positions of the companion (1878-1908) give for the proper motion of A:

 $0''.080$ in $122^{\circ}5$.11504. Σ 2865.

1908.655	188.1	21.27
.671	188.9	21.40
.673	189.0	21.49

1908.67	188.7	21.39
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No third star near enough to measure.

11520. Ho 470.

1908.655	352.9	12.68
.671	351.4	12.43
.689	350.6	12.32

1908.67	351.6	12.48
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The companion is very faint.

1906.65 $353^{\circ}1$ $11^{\circ}92$ 3n Doo.

11559. H 1741.

1908.597	306.98	25.94
.636	306.60	26.06
.652	306.23	26.20

1908.63	306.60	26.07
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Proper motion.

11568. $O\Sigma$ 465.

A and B.

1908.594	321.5	14.36
.597	321.9	14.32
.636	321.1	14.42

1908.61	321.5	14.37
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A and C. ($13^m 2$).

1908.597	235.1	17.82
.636	234.8	18.28
1908.62	235.0	18.05

No other observations of C.

11588. Ho 291.

1908.594	198.0	9.43
.597	198.7	10.22
.636	199.1	9.41
.652	200.4	9.74

1908.62	199.0	9.70
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Change uncertain.

11596. Hd 170.

1908.636	241.5	7.39
.652	242.8	7.39
.655	242.0	7.18
1908.65	242.1	7.32

The apparent change is not confirmed.

11601. A.G. 281. (8^m8, 10^m0).

1908.711	22.0	2.43
.750	20.7	2.44
.766	20.7	2.47
1908.74	21.1	2.45

11602. OΣ 467 rej.

1908.709	274.1	22.96
.711	274.0	22.86
.728	273.6	23.06
1908.72	273.9	22.96

11641. Σ 2894.

A and C. (9^m6).

1908.537	175.73	221.40
.573	174.47	221.55
1908.55	175.10	221.47

B and C. (9^m0).

1908.556	174.37	206.61
.559	174.24	206.51
.575	174.62	206.73
1908.56	174.41	206.62

For this star we have:

1880.70 174.00 204.83 21 Bl

11659. OΣ 469.

A and B.

1908.750	284.77	29.52
.769	284.36	29.96
.788	284.65	29.89
.804	285.30	29.56
1908.78	284.77	29.73

From seven positions, on 22 nights, the apparent motion of A is:

0.047 in 128.4.

To make certain that the motion is all in the larger star, I have connected a third 12^m2 star:

A and C.

1908.750	51.43	52.90
.788	52.37	52.92
.804	52.43	53.61
1908.78	52.08	53.14

11686. OΣ (App.) 232.

A and B.

1908.709	191.53	67.86
.711	191.23	67.97
.728	191.15	68.13
1908.72	191.30	67.99

A and C. (11^m4).

1908.728	268.22	175.02
.750	268.33	174.57
.788	268.60	174.24
1908.76	268.38	174.61

11761. Kr 60.

A and B.

1908.482	104.3	3.25
.520	105.0	3.33
.537	104.4	3.11
.556	104.0	3.20
.573	104.6	3.12
1908.53	104.5	3.20

A and C.

1908.482	59.50	43.46
.520	59.53	43.55
.537	59.33	43.48
.556	59.30	43.54
.559	59.57	43.39
1908.53	59.45	43.48

The only change in AB is in the position-angle.

From 17 positions of AC, each on three or more nights (1890-1908) by Doo (4), Bar (4) and β (9) the proper motion of the principal star is:

0.937 in 244.03.

11821. Ho 617. (8^m0, 13^m5).

1907.772	53.3	17.49
7.807	51.1	17.91
8.518	53.9	17.62
1908.03	52.8	17.67

Probably without change.

11866. Σ 2928.

A and B.

1908.671	311.1	3.87
.673	311.1	3.98
.692	312.2	3.79
1908.68	311.5	3.88

A and C. (11^m9).

1908.671	245.10	97.48
.673	245.42	98.06
.750	245.07	98.15
1908.70	245.20	97.90

I have measured a third star for an independent determination of the proper motion of the principal star.

11882. Espin 106. (9^m2, 9^m7).

1908.518	266.7	8.02
.520	267.9	7.98
.537	267.3	8.06
1908.52	267.3	8.02

11884. Ho 187.

1908.750	286.5	18.91
.769	285.7	18.77
.788	286.2	18.65
1908.77	286.1	18.78

11906. Σ 2932.

A and B.

1908.750	280.7	20.12
.766	281.2	20.01
.769	281.4	20.16
1908.76	281.1	20.10

A and C.

1908.750	12.8	30.02
.766	13.1	30.06
.769	12.2	29.92
1908.76	12.7	30.00

12019. 15 Lacertae. β 451.

A and B.

1908.518	132.23	28.34
.520	132.78	28.08
.537	132.28	27.93
1908.52	132.43	28.12

A and C. (11^m9).

1908.518	309.89	102.86
.520	310.00	102.91
.537	309.67	102.89
1908.52	309.85	102.89

A and D. (12^m3).

1908.518	227.65	127.40
.520	227.85	127.92
.537	227.70	127.78
1908.52	227.73	127.70

No other measures of C and D.

12042. Σ 2955 rej. (7^m7, 11^m1).

1908.537	337.7	22.86
.556	337.8	22.95
.559	337.5	23.04
1908.55	337.7	22.95

12172. Σ 2976.C and D. ($12^m 2$).

1908.750	247.80	132.12
.785	247.97	131.98
.788	248.15	131.12
.804	247.90	131.57
1908.78	247.95	131.70

This measured to show whether or not C has any proper motion.

12214. Ho 197.

AB and C.

1907.879	328.42	41.13
8.460	328.48	40.76
8.482	328.27	40.98
1908.27	328.39	40.96

AB and D.

1907.879	280.48	49.78
8.460	280.48	49.63
8.482	280.67	49.84
1908.27	280.54	49.75

The measures of the distant stars are discordant in distance.

AC 1906.68 329.1 41.67 2n Doo
AD 1906.68 279.7 50.27 2n Doo.

12234. Σ 2993.

A and C.

1908.556	115.26	121.88
.573	115.45	122.50
.597	115.70	122.49
1908.58	115.47	122.29

C is BD $-9^{\circ}6'15.2$. With these measures the proper motion of AB is:

 0.455 in $89^{\circ}6$.12236. H 981. ($9^m 0$, $12^m 5$).

1908.482	281.0	17.85
.559	279.4	17.89
.573	281.4	17.94
1908.54	280.6	17.89

This pair was wrongly identified in 1905, and the measure given in Part II belongs to an other star.

12257. ψ^1 Aquarii. β 1220.

BC and E.

1908.597	358.1	18.31
.633	357.7	18.46
.671	357.3	18.29
1908.63	357.7	18.35

Rejecting my single measure in 1877, the three positions give for the proper motion of BC, which is the same as that of ψ^1 Aquarii:

 0.375 in $89^{\circ}4$.

In addition to the two values given from meridian positions, we have:

Auwers 0.350 in $90^{\circ}8$.12272. H 3180. ($9^m 4$, $12^m 2$).

1908.636	265.0	23.01
.652	263.7	23.05
.671	263.4	23.07
1908.65	264.0	23.04

No other measures.

12274. β 182.

AB and C.

1908.750	71.34	76.10
.824	71.12	75.46
.826	71.28	75.54
.882	71.83	75.80
1908.82	71.39	75.73

These measures are continued to improve the proper motion of the system.

12285. 8 Andromedae. β 717.A and C. ($10^m 3$).

1908.826	130.61	219.28
.845	131.04	219.37
.862	130.95	219.41
1908.84	130.87	219.35

The following is the only prior observation:

1880.28 $130^{\circ}67$ $219^{\circ}41$ 2n Bl12351. H 5398. ($9^m 4$, $9^m 6$).

1908.633	4.0	29.43
.671	3.4	29.16
.750	3.1	29.40
1908.68	3.5	29.33

This is BD $-18^{\circ}6'30.6$. The G.C. place is substantially correct. No other measures.

12353. H 3192. ($9^m 4$, $9^m 7$).

1908.633	116.6	27.30
.671	116.3	27.23
.750	116.6	26.96
1908.68	116.5	27.16

No other measures.

12361. H 3193. ($9^m 5$, $10^m 1$).

1908.573	218.3	34.34
.633	217.8	34.55
.636	218.5	34.56
1908.61	218.2	34.48

12365. H 1877. ($12^m 4$, $14^m 8$).

A and B.

1908.482	357.4	20.12
.575	356.0	20.44
.636	357.0	19.85
1908.56	356.8	20.14

A and h 2241.

1908.444	243.3	50.07
.482	243.6	50.38
.518	243.4	50.66
1908.48	243.4	50.37

This is a well known planetary nebula (Dreyer 7662) with the minute star in the center, which is characteristic of all nebulae of this class. The central star was rated 15^m in my measures at Mt. Hamilton. This, like many of the central stars in the planetary nebulae, and similar attendants to bright stars, is a test of atmosphere rather than aperture, and at times beyond the reach of the largest telescopes. On the occasion of the foregoing measures it was not well seen owing to the unsteady condition of the air. The prior measures of the nebula, and the principal star of H 1877 will be found in Publ. L. O. II p. 167. There is no suggestion of any change in the last fifty years.

12366. See 485.

1908.671	131.3	5.03
.826	129.6	5.15
1908.75	130.4	5.09

12384. O Σ (App.) 246.

A and B.

1907.810	114.33	86.74
.845	114.23	86.80
.865	114.45	86.80
1907.84	114.34	86.78

A and C. ($10^m 9$).

1907.845	156.38	135.47
7.865	156.68	135.82
8.479	156.47	135.51
1908.06	156.51	135.60

B and C.

1907.845	195.35	92.41
7.865	195.68	92.02
8.479	195.93	92.57
1908.06	195.65	92.33

The third star is connected to get hereafter the separate proper motions of the large stars.

12400. H 3197. (9^m7, 9^m8).

1908.633	309.3	8.20
.671	308.9	8.19
.750	307.8	8.29
1908.68	308.7	8.23

Apparently unchanged.

12441. β 388.

1908.520	333.1	20.33
.575	333.4	20.17
.594	333.4	20.24
1908.56	333.3	20.25

12573. O Σ 507.

A and B.

1908.711	266.9	0.67
.750	269.5	0.64
.769	270.6	0.64
1908.74	269.0	0.65

AB and C.

1908.709	352.95	49.27
.711	352.43	49.37
.728	352.42	49.15
1908.72	352.60	49.26

12696. Hn 60.

1907.695	316.5	0.31
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Rapid motion; a difficult pair.

The following pairs are of recent discovery, and are not given in the General Catalogue.

BD +47°1122.

RA. = 5^h8^m46^s
Decl. = +47°11'7."

A and B. (9^m9, 10^m4).

1908.633	254.7	0.94
.750	251.9	1.13
.769	250.0	0.97
1908.72	252.2	1.01

A and C. (9^m6).

1908.288	243.72	34.44
.633	243.13	34.52
.671	243.33	34.47
1908.53	243.39	34.48

This was discovered by Espin in 1908.

BD +43°1402.

RA. = 5^h51^m4^s
Decl. = +43°58'3."

1908.079	89.8	4.56
.291	90.1	4.41
.633	88.4	4.32
1908.33	89.4	4.43

Discovered independently by Espin, but previously recorded as Aitken 1571.

BD -9°4062. (9^m2, 12^m5).

RA. = 14^h57^m10^s
Decl. = -9°22'."

1908.156	253.8	10.98
.192	255.3	11.22
.266	253.6	11.29
1908.20	254.2	11.16

Discovered by Abetti at Arcetri when observing an asteroid.

Yerkes Observatory, Williams Bay, Wisc., 1908 Nov. 30.

S. W. Burnham.

Photographische Aufnahmen von kleinen Planeten und Jupitersmonden.

Objekt	M.Z.Kgst.	α 1909.0	δ 1909.0	Gr.	Bb.
1909 Jan. 10.					
(28) Bellona	6 ^h 43 ^m 1	5 ^h 53 ^m 9	+12° 2'	10 ^m	W
1909 Jan. 18.					
(566) Stereokopia	7 50.9	8 38.7	+23 14	11.5	L
1909 FO (neu)	7 51.8	5 52.8	+12 6	14	W
(601) [1906 UN]	8 19.0	6 15.3	+ 2 49	13.0	K
1909 FP (neu)	"	6 17.9	+ 2 11	13.1	"
(289) Nenetta	11 55.0	7 28.2	+12 30	12.9	K
(600) [1906 UM]	"	7 30.2	+14 54	13.1	"
1909 FQ (neu)	"	7 38.9	+15 12	13.6	"
1909 FR (neu)	"	7 41.0	+16 34	12.6	"
(64) Angelina	12 31.4	9 13.9	+16 9	9.7	L
(89) Julia	"	9 24.8	+15 16	10.8	"
(652) Jubilatrix	13 31.3	12 7.0	+20 28	14	W
Tägl. Bewegungen: (566) -0 ^m 8 +4', (601) -0 ^m 6 +2', FP -0 ^m 6 +3', (289) -0 ^m 9 +2', (600) -0 ^m 9 +4', FQ -1 ^m 0 +7', FR -0 ^m 9 -1'.					

1909 Jan. 19.					
(187) Lamberta	9 1.4	7 19.5	+38 49	11.5	L

Objekt	M.Z.Kgst.	α 1909.0	δ 1909.0	Gr.	Bb.
(416) Vaticana	9 ^h 1 ^m 4	7 ^h 32 ^m 3	+36° 55'	12.0	L
1909 FO	10 49.3	5 52.3	+12 8	14	W
(64) Angelina	12 27.4	9 13.0	+16 12	9.7	K
(526) Jena	"	9 15.9	+15 27	12.8	"
(89) Julia	"	9 23.8	+15 17	10.8	"
VIII. Jupitersmond	13 23.3	10 56.0	+ 7 42	16.5	W
Nicht gefunden sind (567) Eleutheria u. (597) [1906 UB]. K.					
Tägliche Bewegungen: (187) -1 ^m 1 0', (416) -1 ^m 0 +1', FO -0 ^m 5 +2', VIII. Jupitersmond -0 ^m 2 +1'.					
1909 Jan. 20.					
(324) Bambergia	8 50.9	7 34.9	+32 17	9.7	L
1909 FK	9 52.6	6 36.0	+35 40	12.3	K
1909 FL	"	6 37.8	+33 1	12.6	"
(528) Rezia	"	6 39.3	+37 16	13.2	"
1909 FM	"	6 41.4	+32 52	13.0	"
(562) Salome	12 46.6	7 56.4	+32 17	13.3	K
(362) Havnia	"	7 58.0	+34 7	11.0	"
Tägliche Bewegungen: (324) -1 ^m 3 -1', FK -1 ^m 0 -2', FL -0 ^m 9 0', (528) -0 ^m 9 +2', FM -0 ^m 9 +2', (362) -1 ^m 1 +4'.					