				°	″	°	″	″
1901·78	A	36	1	299·4	0″·32	+ 5·4	+0″·03	+0″·02
03·91	VB	15	2	301·5		+ 5·6	+ ·03	
05·82	Loh	11	1	273·3		— 24·0	— ·14	
05·84	A	36	2	300·0	·37	+ 2·7	+ ·02	+ ·03
06·66	Loh	11	1	305·8		+ 7·3	+ ·04	
08·56	Wz	19	1	322·8		+ 21·5	+ ·11	
08·75	Com	15½	2	308·1		+ 6·7	+ ·03	
08·78	Do	6	4	291·2	·44	— 10·2	— ·05	+ ·15
08·78	VB	15	3	310·8	·30	+ 9·4	+ ·05	+ ·01
09·66	VB	15	2	314·2	·28	+ 11·7	+ ·05	+ ·01
09·67	A	36	2	298·6	·33	— 3·9	— ·02	+ ·06
10·25	Com	15½	2	287·8	·28	— 15·5	— ·07	+ ·02
10·78	VB	15	1	312·0	·30	+ 7·9	+ ·03	+ ·06
11·68	VB	15	2	307·8	·25	+ 1·5	+ ·01	+ ·04
11·78	Com	15½	1	doubtful				
12·1	GrO	28	3	297·4	·32	— 10·7	— ·04	+ ·13
12·72	A	36	2	303·2	·28	— 7·3	— ·02	+ ·11
12·75	VB	15	3	332·8	·28	+ 22·2	+ ·07	+ ·11
14·64	A	36	1	276	(·1)	— 46	— ·08	(± ·0)
14·66	A	36	1	299	(·1)	— 24	— ·04	(± ·0)
14·86	Ra	8	6	319·0	·38			
15·19	A	36	9	too close (computed dist. 0″·1)				
17·72	Com	15½	2	uncertain				
21·53	A	36	3	115·7	·17	+ 15·9	+ ·05	— ·01
228·7	Mag *)		2	110·3	·167	+ 7·3	+ ·030	— ·065
23·78	Mag *)		4	116·4	·171	+ 11·7	+ ·054	— ·093

*) MAGGINI's observations were not used for the determination of the orbit. They have been added at Leiden.

				°	″	°	″	″
1841·64	Ma	9½	2	106·2	0″·65	— 11·3	—0″·22	—0″·44
42·80			3	121·1	·85	+ 3·5	+ ·07	— ·24
43·65			2	120·1	·82	+ 2·5	+ ·05	— ·26
45·51			1	115·8	·79	— 2·0	— ·04	— ·28
47·98			1	123·9	·85	+ 5·9	+ ·11	— ·21
51·85			1	126·2	·67	+ 7·7	+ ·14	— ·37
53·94			1	122·8	·81	+ 4·2	+ ·07	— ·20
54·78			1	114·2		— 4·4	— ·08	
55·82			1	118·4		— 0·3	— ·01	
56·78			1	127·7		+ 8·8	+ ·15	
58·00			2	128·2		+ 9·2	+ ·16	
59·87			1	129·3		+ 10·3	+ ·17	
61·98			2	148·0		+ 28·4	+ ·43	

The estimated distances in the period 1857—78 seem to be 0″·2 too small in the mean. In an orbit of this type the good representation of the angles does not imply that the elements are near the truth. Careful measures of distance are especially wanted. Some of the residuals could be reduced by assuming an earlier periastron passage with a proportional decrease in ρ, but at present such corrections seem premature. For a really definitive orbit we will have to wait until the measures show that the distance is again decreasing.

The orbit and the masses of 40 Eridani BC, by *W. H. van den Bos.*

Recent observations of this important binary system present large deviations from the orbits published by DOOLITTLE and DOBERCK. The observed motion is slower and the distance much larger than predicted, pointing to a larger excentricity, period and major axis than given by previous computations.

The measures of precision, 1850—1925, cover an arc of 150° and are not yet sufficient in themselves for a reliable orbit; previous to these we have a single night's position angle by W. HERSCHEL in 1783, when the distance was roughly 4″—8″, and another by W. STRUVE in 1825 which is not a real measure, but is based on the fact that STRUVE estimated the third star C to be on the line joining A and B. The close pair must have been very difficult to STRUVE in consequence of the faintness of the third star, the low altitude at Dorpat and the at that time much smaller distance. Even at the present time, with a distance nearly twice that in 1825, the pair is too difficult for reliable measures with the 10½-inch at Leiden.

The older orbits by GORE (*M. N.* 1886 March) and VON GLASENAPP (*A. N.* 3306) represent STRUVE's angle, but do not fit the later measures. The more recent orbits disregard STRUVE's result and rely on HERSCHEL's angle, leaving large residuals for STRUVE's observation:

BURNHAM, *Lick. Publ.* II	+ 42°
STICHTENOTH, *A. N.* 3366	+ 100°
DOOLITTLE, *Proc. Amer. Phil. Soc.* **42**, 173	+ 57°
DOBERCK, *A. N.* 4400	+ 96°

This is equivalent to stating that Struve did not see the companion at all; in fact, he was unable to see it on other nights. Still it will appear presently, that STRUVE's result is not only a correct observation, but that it is much more exact than has been thought heretofore.

A common feature of the older orbits is the small value of the excentricity, ranging from 0·067 (STICHTENOTH) to 0.222 (VON GLASENAPP). The recent observations show that the excentricity is much larger, suggesting a better representation of STRUVE's result.

Though the measures to this time are not sufficient for a definitive orbit, a new determination is desirable because of the great interest attached to this system, its large parallax and proper motion, but first of all the peculiar spectral types of the three stars, especially of the white dwarf B.

THIELE's admirable analytical method of computing a double star orbit requires three normal places and the constant $c = \rho^2 \frac{d\theta}{dt}$. From the measures 1850 — 1925 c was found to be — 0.349, the units being radians per annum for $\frac{d\theta}{dt}$ and seconds of arc for ρ. An attempt to derive the elements from the modern measures only proved to be a failure. Then the three normal places.

1783.13	327°.3	...
1863.13	147 .0	4″.40
1923.13	11 .4	3 .89

were adopted, and had to be supplemented by a hypothetical distance for 1783. As this distance was estimated about 7″ from a drawing of the apparent orbit, it was decided to compute two sets of elements, based on distances of 5″ and 8″. If these two orbits deviated from the observed motion 1850—1925 in opposite sense, a closer approximation might be found by interpolation, until the best fit for the modern measures would have been obtained.

As was expected the distance of 5″ proved to be too small; the resulting orbit gave $P = 200$ years, $e = 0.173$ and a residual of $+86°$ for STRUVE's angle. The distance of 8″ however was such a fortunate guess, that not only the modern measures were fairly well represented, but that STRUVE's angle was satisfied within a degree.

These elements were therefore adopted as the basis of a least squares solution; they are:

Provisional elements, equinox 1900.

$P = 248^{y}.69$ $n = 1°.4476$ $T = 1850.40$ $e = 0.3990$
$A = -5''.7214$ $B = +1''.8509$ $F = -2''.2126$ $G = +3''.3539$
$a = 6''.893$ $i = \pm 108°.52$ $\omega = 328°.97$ ☊ $= 151°.26$

THIELE'S method is easily adapted to the "natural" elements A, B, F and G; in fact they are more convenient than his own polar elements, both in the formulae for the ephemeris and for the computation of the CAMPBELL set.

We reduce the normal places to rectangular coordinates and compute the double areas of the triangles, which furnish the three equations used by THIELE for determining the mean motion and the differences of the excentric anomalies, and thereafter the quantities $e \sin E_2$, and $e \cos E_2$. There is an error in THIELE's formulae for these two quantities (*A.N.* **104**, 249); the sine and the cosine of E_2 should be interchanged. Having found the excentricity and the three excentric anomalies we derive the corresponding mean anomalies, and from them three values for the epoch of periastron passage. We then compute the X and Y for the three normal places from the formulae

$$X = \cos E - e \qquad Y = (1 - e^2)^{\frac{1}{2}} \sin E$$

or take them from the Union Observatory tables, and by means of the formulas for the ephemeris

$$x = AX + FY \qquad y = BX + GY$$

we find the natural elements A, B, F and G from two normal places, using the third as a check.

A similar abridgment is found in the well known method of ZWIERS by the introduction of the natural elements. In this method we draw the apparent orbit, construct its centre and the projected major and minor axes and derive the excentricity from measurements on the major axis. Then the polar coordinates with respect to the centre of the extremities of these axes are read off, and the CAMPBELL elements are computed from these. If instead of the polar coordinates we read off the rectangular coordinates of the same points, the orbit is all but finished, as we have only to multiply those of the minor axis by sec φ (where $\sin \varphi = e$), and the natural elements are found. There remains only to determine P and T by measurements of areas as done by ZWIERS.

The preliminary orbit represents the measures since 1903 well enough, but there is a systematic run in the residuals for 1877—1903. This is easily traced as a consequence of the weakness of the first and second normal places. The first depends on a single position angle by HERSCHEL and a hypothetical distance, the second almost exclusively on OTTO STRUVE'S observations, which are subject to considerable uncertainties. A differential correction in position angle and distance according to the new method was made, assigning weight 1 to HERSCHEL's and STRUVE's angles, weight 2 in angle and 1 in distance to three normal places based on the measures 1850—1877, and weight 4 in angle and 2 in distance to six normal places based on the measures since 1877.

After I had derived the normal equations, Mr. FINSEN kindly undertook their solution, for which my thanks are due to him.

The resulting elements are:

P	247.92	± 9.7	(mean error)
n	1°.4521	0.057	
T	1848.93	0.93	
e	0.4024	0.020	
A	− 5″.6304	0″.22	
B	+ 1″.7654	0″.16	
F	− 2″.3986	0″.19	
G	+ 3″.4239	0″.08	
a	6″.8945		
i	± 108°.45		
ω	326°.96		
☊	150°.96		

equinox 1900.

The superfluous decimals are only retained for the sake of uniformity in the table of orbits. The sum of the squares of the residuals in the equations of condition reduced to weight one has diminished from 0.46 to 0.30 square seconds of arc.

The following list of observations gives the date, the observer, the aperture of the telescope, the number of nights, the position angle reduced to 1900, the distance and the residuals observed minus computed in angle, same reduced to arc, and in distance, I from the provisional and II from the definitive orbit. For OTTO STRUVE the "corrected" result is given below the "observed". The observations marked* are shown on the diagram.

						I			II		
				°	″	°	″	″	°	″	″
1783.13*	H	7 ft	1	327.3	[7.99 c]	± 0.0	± 0.00	...	− 0.1	− 0.01	...
1825.12*	Σ	9½	1	288. ±	[2.24 c]	+ 0.4	+ .02	...	+ 1.7	+ .07	...
1851.06	Da	6	1	160.1	3. ±	− 0.9	− .06	...	+ 0.7	+ .05	...
1851.22*	OΣ	15	4	160.0	3.89	− 0.8	− .05	+ 0.19	+ 0.8	+ .05	+ 0.09
				155.6	3.92	− 5.2	− .34	+ .22	− 4.6	− .30	+ .12
1855.06	OΣ	15	6	159.9	4.11	+ 4.2	+ .29	+ .04	+ 5.6	+ .40	− .03
				154.2	4.14	− 1.5	− .11	+ .07	− 0.1	− .01	± .00
1864.85*	Winn	15	2	147.8	4.45	− 0.8	− .04	+ .21	+ 3.9	+ .30	+ .06
1865.90	OΣ	15	2	147.2	4.24	+ 3.1	+ .24	− .12	+ 4.3	+ .33	− .13
				144.2	4.26	+ 0.1	+ .01	− .10	+ 1.3	+ .10	− .11
1869.10	OΣ	15	1	142.3	4.46	+ 1.6	+ .12	+ .19	+ 2.9	+ .21	+ .20
				140.6	4.46	− 0.1	− .01	+ .19	+ 1.2	+ .09	+ .20
1871.99	Knott	7	1	125. ±	2. ±						
1873.67*	OΣ	15	5,4	137.4	4.29	+ 2.0	+ .14	+ .28	+ 3.3	+ .23	+ .30
				137.9	4.27	+ 2.5	+ .17	+ .26	+ 3.8	+ .26	+ .28
1875.90	Gled	9	1	136.7	4.3	+ 4.1	+ .28	+ .4	+ 5.5	+ .37	+ .46
1877.13	OΣ	15	2	126.5	4.24	− 4.4	− .29	+ .47	− 3.1	− .20	+ .51
				128.1	4.18	− 2.8	− .18	+ .41	− 1.5	− .10	+ .45
1877.84*	β	18½	7,6	128.3	3.92	− 1.4	− .09	+ .20	− 0.1	− .01	+ .24
1877.84	Cinc	11	3	127.6	3.36	− 2.1	− .14	− .36	− 0.8	− .05	− .32
1877.95	Dem	7	4	126.5	3.94	− 3.2	− .20	+ .23	− 1.9	− .12	+ .27
1879.05	β	18½	4	125.5	3.49	− 2.4	− .14	− .12	− 1.0	− .06	− .09
1879.11	Cinc	11	1	123.0		− 4.9	− .30		− 3.5	− .22	
1879.18	Hl	26	2	125.1	3.51	− 2.7	− .16	− .08	− 1.3	− .08	− .05
1879.68	β	6	2,1	123.1	3.64	− 3.8	− .23	+ .07	− 2.4	− .15	+ .10
1879.75	Cinc	11	1	120.1	3.29	− 6.8	− .42	− .26	− 5.4	− .33	− .23
1880.09*	β	18½	5	121.4	3.28	− 4.9	− .31	− .24	− 3.5	− .21	− .22
1880.95	β	18½	5	122.1	3.16	− 2.9	− .17	− .29	− 1.4	− .08	− .27
1881.84	β	12	5,6	119.1	3.53	− 4.3	− .26	+ .16	− 2.7	− .16	+ .18
1882.12	Hl	26	2	118.2	3.24	− 4.7	− .27	− .11	− 3.1	− .18	− .09
1883.00	β	18½	2	119.3	3.07	− 1.1	− .06	− .18	+ 0.4	+ .02	− .16
1883.80	Hl	26	2	115.9	3.10	− 3.9	− .22	− .11	− 2.3	− .13	− .08
1884.16	HΣ	15	1	118.3	3.74	− 0.8	− .04	+ .56	+ 0.7	+ .04	+ .58
1886.00	Leav	26	2	112.3	3.22	− 2.9	− .15	+ .20	− 1.2	− .06	+ .22
1886.09*	Hl	26	6	112.3	3.00	− 2.9	− .15	− .02	− 1.2	− .06	± .00
1886.92	Tar	10	3	111.1	3.01	− 2.1	− .11	+ .06	− 0.4	− .02	+ .08
1887.14	Sp	19	4,1	109.3	2.56	− 3.3	− .17	− .37	− 1.6	− .08	− .35
1888.08	Sp	19	2	109.6	2.26	− 0.8	− .04	− .60	+ 0.9	+ .04	− .58
1888.12	Hl	26	5	107.8	3.04	− 2.6	− .13	+ .18	− 0.9	− .04	+ .20
1888.84	β	12	3	106.9	2.94	− 1.6	− .08	+ .14	+ 0.1	+ .00	+ .16
1888.87	Tar	10	3	105.1	2.81	− 3.4	− .17	+ .01	− 1.7	− .08	+ .03
1889.03	Sp	19	2,1	107.7	2.87	− 0.2	− .01	+ .09	+ 1.7	+ .08	+ .11
1889.12	Hl	26	4	103.6	2.79	− 4.3	− .21	+ .01	− 2.4	− .11	+ .03
1890.73*	β	36	4	100.0	2.68	− 3.7	− .17	+ .01	− 1.7	− .08	+ .02
1890.98	Ho	18½	3	99.0	[1.72]	− 4.0	− .19	[− .92]	− 2.0	− .09	[− .91]
1891.00	Sp	19	2	101.5	2.62	− 1.2	− .06	− .02	+ 0.8	+ .04	− .01
1891.05	Hl	26	5	98.5	2.65	− 4.2	− .19	+ .01	− 2.2	− .10	+ .02
1891.78	β	36	4	97.4	2.48	− 3.0	− .14	− .11	− 1.1	− .05	− .11
1893.21	Com	15½	1	93.8	2.18	− 2.2	− .10	− .32	− 0.5	− .02	− .33
1895.89	Do	6	2	83.6		− 3.4	− .14		− 1.8	− .08	
1895.91	Coll	10	1	87.4	2.32	+ 0.4	+ .02	− .06	+ 2.1	+ .09	− .08
1896.95	Com	15½	1	79.5		− 3.7	− .15		− 2.1	− .09	
1897.97	A	12	2	77.2	2.62	− 2.3	− .09	+ .30	− 0.7	− .03	+ .28
1899.11*	A	12	2	73.6	2.39	− 1.6	− .06	+ .09	− 0.2	− .01	+ .07
1899.80	Doo	18	3	68.4	2.30	− 4.1	− .16	± .00	− 2.5	− .10	− .02
1900.74	Sola	6	1	70.	[1.3]	+ 1.	+ .04		+ 3.	+ .1	
1900.92	Doo	18	2	63.4	2.40	− 5.1	− .20	+ .11	− 3.5	− .14	+ .08
1901.04	Loh	11	1	65.4		− 2.4	− .10		− 0.8	− .03	
1901.98	Com	15½	5	62.3	2.28	− 2.1	− .08	− .03	− 0.8	− .03	− .05
1902.00	Do	6	4	75.0							
1903.14	Doo	18	4	55.2	2.24	− 4.6	− .19	− .09	− 3.7	− .15	− .11
1903.18	Com	15½	1	55.9	1.97	− 3.9	− .16	− .36	− 3.0	− .12	− .38
1903.87	A	36	2	56.8	2.31	− 0.4	− .02	− .04	+ 0.5	+ .02	− .06

						I			II		
				°	"	°	"	"	°	"	"
1904.10	Doo	18	1	58.0	1.81	+ 1.7	+ .07	− .54	+ 2.6	+ .11	− .56
1904.70	β	40	3	55.2	2.38	+ 1.0	+ .04	+ .01	+ 1.9	+ .08	− .01
1905.11	Loh	11	1	56.5		+ 3.7	+ .16		+ 4.6	+ .19	
1907.80*	β	40	4	43.8	2.49	+ 0.2	+ .01	− .01	+ 0.8	+ .04	− .07
1907.97	Wz	19	2	44.6	2.71	+ 1.0	+ .04	+ .18	+ 1.6	+ .07	+ .15
1908.83	β	40	5	42.6	2.57	+ 2.0	+ .09	− .02	+ 2.5	+ .11	− .05
1912.04	A	36	2	29.5	2.66	− 2.2	− .11	− .17	− 2.0	− .10	− .19
1912.11	Jonc	14	1	29.4	2.88	− 2.3	− .11	+ .05	− 2.1	− .10	+ .03
1912.11	Vddk	14	1	29.9	2.53	− 1.8	− .09	− .30	− 1.6	− .08	− .32
1913.14*	vBsb	15	3	29.4	3.01	+ 0.3	+ .02	+ .10	+ 0.5	+ .03	+ .08
1914.06	vBsb	15	1	23.5	3.38	− 3.5	− .18	+ .38	− 3.3	− .17	+ .35
1915.09	Rabe	8	1	29.4	2.2	+ 4.6	+ .25		+ 4.8	+ .26	
1915.13	Ol	26	pg	26.1	3.02	+ 1.4	+ .07	− .07	+ 1.6	+ .08	− .09
1916.77	Ald	26	pg	21.4	3.31	± 0.0	± .00	+ .06	+ 0.1	+ .01	+ .04
1916.83	Ol	26	3	20.8	3.22	− 0.5	− .03	− .03	− 0.4	− .02	− .05
1917.08	A	36	1	19.0	3.18	− 1.8	− .10	− .10	− 1.7	− .10	− .12
1917.16	Com	15½	2	22.5	3.09	+ 1.7	+ .10	− .19	+ 1.8	+ .10	− .20
1918.14	Com	15½	3	20.8	3.17	+ 1.8	+ .11	− .21	+ 1.8	+ .11	− .22
1919.09*	Leav	10½	3	16.6	3.40	− 0.7	− .04	− .08	− 0.7	− .04	− .09
1921.00	Abet	12	2	15.3	3.29	+ 1.0	+ .06	− .38	+ 1.0	+ .06	− .39
1921.79	A	36	2	11.1	3.54	− 2.1	− .14	− .21	− 2.1	− .14	− .22
1922.02	Nech	15½	2	12.5	3.88	− 0.3	− .02	+ .10	− 0.4	− .03	+ .09
1924.78	Ald	26	pg	9.2	4.06	± 0.0	± .00	± .00	− 0.1	− .01	− .01
1925.02	vdBs	10½	5	12.8	[3.35]	+ 3.8	+ .27		+ 3.7	+ .26	
1925.99*	vdBs	26½	4	8.7	4.25	+ 0.9	+ .07	+ .05	+ 0.8	+ .06	+ .04

The systematic character of the residuals in angle for 1877—1903 has not quite disappeared, but has become much less pronounced by the appearance of some positive residuals. It is interesting to note the sudden change from positive to negative residuals in angle about 1876, when the angle changed from nearer the vertical to nearer the horizontal direction. Again in 1910 the same takes place, but less pronounced. The majority of observers seems inclined to measure the angle too near the vertical when observing with eyes perpendicular, and too near the horizontal direction when the eyes are parallel.

Though some of the elements will be subject to material changes, the general character of the orbit seems to be well established, and the resulting mass is likely to be a close approximation. As it is of special interest to derive the mass of the white dwarf B, it seems worth while to undertake a new discussion of the measures of AB. As these measures, rejecting the single and unreliable observation of HERSCHEL, begin already in 1825, when C was in the opposite part of its orbit, it is possible to separate the orbital motion of B round the centre of gravity of B and C from the motion of this centre round A.

The measures of AB were reduced to 1900 and combined into normal places in rectangular coordinates. Removing the orbital motion of BC by means of a provisional value for the mass ratio, the relative motion of the system BC with respect to the bright star was obtained.

This can still be represented by uniform rectilinear motion far within the errors of observation. Removing this motion the mass ratio is easily obtained by comparison of the residuals with the computed coordinates of BC.

The first approximation was:

$$x = -21''.71 + 0''.0597\,(t - 1900)$$
$$y = +79''.85 + 0''.0074\,(t - 1900)$$
$$\text{mass}\ \frac{C}{B + C} = 0.35$$

The residuals from this solution showed a distinct correlation with the computed coordinates of BC, and a second approximation was made:

$$x = -21''.71 + 0''.0597\,(t - 1900)$$
$$y = +79''.90 + 0''.0074\,(t - 1900)$$
$$\text{mass}\ \frac{C}{B + C} = 0.32$$

which was found satisfactory.

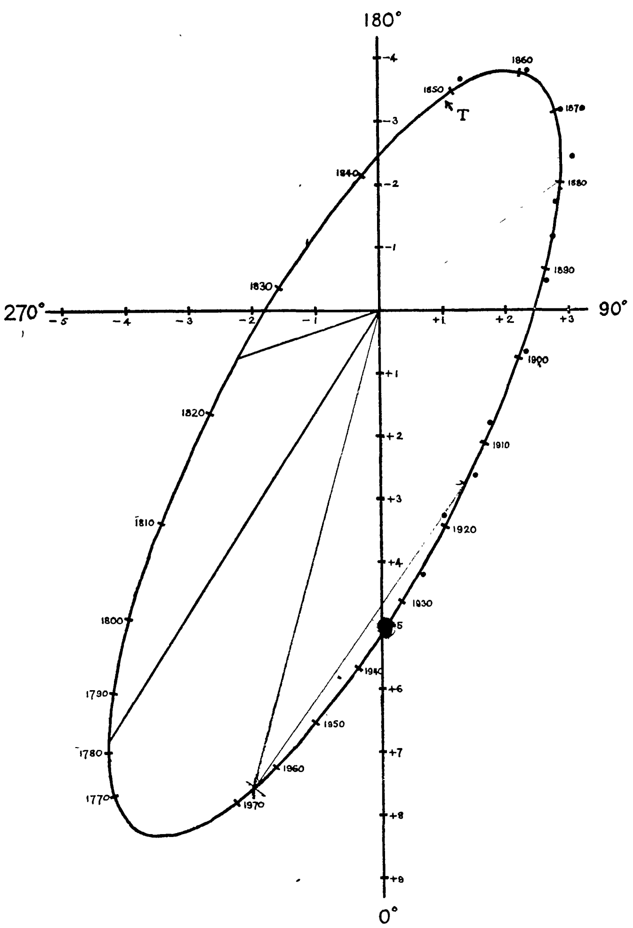
The following table gives the date, the observed x and y of AB, the computed x and y of BC, and the residuals in x and y from the first and second solution.

	"	"	"	"	"	"	"	"
1783.13	− 25.45	+ 77.72	+ 6.72	− 4.30	+ 5.57	− 2.70	+ 5.37	− 2.62
1825.00	26.29	80.96	+ 0.62	− 2.14	+ 0.10	+ 0.98	− 0.08	+ 0.99
1836.25	25.33	79.59	− 1.52	− 0.74	− .36	+ .02	− .31	− .01
1853.60	22.96	78.62	− 3.66	+ 1.63	+ .23	− .25	+ .34	− .35
1865.22	22.49	78.93	− 3.52	+ 2.60	+ .06	+ .32	+ .17	+ .19
1878.74	22.68	78.49	− 2.16	+ 2.88	− .47	− .12	− .41	− .26
1884.78	22.17	78.75	− 1.37	+ 2.78	− .03	+ .05	+ .01	− .08
1889.33	22.13	78.95	− 0.74	+ 2.65	− .04	+ .18	− .02	+ .05
1900.06	21.97	79.16	+ 0.78	+ 2.18	+ .01	+ .13	− .02	+ .02
1904.82	21.82	79.24	+ 1.45	+ 1.92	+ .11	+ .09	+ .07	− .01
1916.36	21.64	79.66	+ 2.99	+ 1.22	+ .14	+ .19	+ .06	+ .10
1924.70	− 21.55	+ 79.74	+ 4.02	+ 0.66	+ .10	+ .01	− .02	− .06

The formulae give for the motion of the centre of gravity of B and C round A:

1900: 105°.20, 82″.69; motion in a century: 6″.025 in 7°.1.

This direction is nearly perpendicular to the radius vector; if we take it to represent motion in a circular orbit, the period would be 8630 years. It is interesting to compare these results with those derived by Dr. H. L. ALDEN from parallax plates. He obtained for



the mass ratio 0.294 and for the period of the circular orbit 8590 years, a remarkable agreement indeed. In judging the relative efficiency of the photographic method and the micrometer observations for this and other work involving wide distances it should be remembered that, whereas my results are derived from visual observations covering a century (HERSCHEL's measure of AB being unreliable, and the later measures giving satisfactory residuals since 1880 only), the parallax plates extend over a period of eight years only.

The mean of the periods, 8610 years, combined with a radius of 82″.7, gives a dynamical parallax (mass 1) of 0″.197. The resulting mass of the whole triple system is too small (0.92 ☉) but of the correct order. The mean of the mass ratio's 0.31, may be considered as very accurate; its mean error is probably less than 0.02. The masses themselves become much more uncertain in consequence of the uncertainty of the parallax. The absolute trigonometric parallax is given:

+ 0″.203 ± 0″.008 (p.e.)

in SCHLESINGER's Catalogue. The combined mass of B and C becomes 0.64 ☉, or the mass of B 0.44 and of C 0.20 ☉. The mean errors of the semi-axis major and the period are 2.9 and 3.9 percent respectively. That of the dynamical parallax is probably less than either, as the uncertainties in a and P to a large extent counterbalance each other; it may be estimated as 2 percent. This combined with the mean error of 6 percent in the parallax gives already 24 percent in the mass, as it enters in the cube. The mean errors of the masses of B and C may therefore be estimated as ± 0.11 ☉ and ± 0.05 ☉ respectively.

Taking the apparent magnitudes and spectral types of the three stars as 4.48, G5; 9.2, B9 and 11.2, Mdp, we have the absolute visual magnitudes 6.02, 10.7 and 12.7 or bolometric 5.85, 10.3 and 10.9. According to EDDINGTON's mass-luminosity curve the masses should be 0.76, 0.24 and 0.28 ☉, but B should not agree with this curve, as in fact it does not.

Ephemeris BC (equinox 1900).

M	t	x	y	θ	ρ
°		″	″	°	″
+ 90	1910.91	+ 2.281	+ 1.561	34.39	2.765
96	1915.04	2.825	1.301	24.73	3.110
102	1919.17	3.348	1.033	17.15	3.504
108	1923.31	3.853	0.758	11.13	3.927
114	1927.44	4.334	0.478	6.29	4.360
120	1931.57	4.791	+ 0.197	2.35	4.795
126	1935.70	5.225	— 0.086	359.06	5.226
132	1939.83	5.633	0.369	356.25	5.645
138	1943.97	6.014	0.650	353.83	6.049
144	1948.10	6.370	0.928	351.71	6.438
150	1952.23	+ 6.697	— 1.202	349.82	6.804

The correction for precession is:

$$\theta_t - \theta_{1900} = + 0°0050\ (t - 1900).$$