the 27th of August; and the others of various stars. There are ten eclipses of *Jupiter's* satellites; viz. five of the first, and five of the second. To the whole is subjoined the monthly mean of the barometer and thermometer during the year, with a statement of the prevailing wind, which appears to be north-west and south.

II. A letter from Professor Bessel to Sir J. Herschel, Bart., dated Konigsberg, Oct. 23, 1838.

Esteemed Sir,—Having succeeded in obtaining a long-looked-for result, and presuming that it will interest so great and zealous an explorer of the heavens as yourself, I take the liberty of making a communication to you thereupon. Should you consider this communication of sufficient importance to lay before other friends of Astronomy, I not only have no objection, but request you to do so. With this view, I might have sent it to you through Mr. Baily; and I should have preferred this course, as it would have interfered less with the important affairs claiming your immediate attention on your return to England. But, to you, I can write in my own language, and thus secure my meaning from indistinctness.

After so many unsuccessful attempts to determine the parallax of a fixed star, I thought it worth while to try what might be accomplished by means of the accuracy which my great Fraunhofer Heliometer gives to the observations. I undertook to make this investigation upon the star 61 *Cygni*, which, by reason of its great proper motion, is perhaps the best of all; which affords the advantage of being a double star, and on that account may be observed with greater accuracy; and which is so near the pole that, with the exception of a small part of the year, it can always be observed at night at a sufficient distance from the horizon. I began the comparisons of this star in September 1834, by measuring its distance from two small stars of the 11th magnitude, of which one precedes, and the other is to the northward. But I soon perceived that the atmosphere was seldom sufficiently favourable to allow of the observation of stars so small; and, therefore, I resolved to select brighter ones, although somewhat more distant. In the year 1835, researches on the length of the pendulum at Berlin took me away for three months from the observatory; and when I returned, Halley's Comet had made its appearance, and claimed all the clear nights. In 1836, I was too much occupied with the calculations of the measurement of a degree in this country, and with editing my work on the subject, to be able to prosecute the observations of α *Cygni* so uninterruptedly as was necessary, in my opinion, in order that they might afford an unequivocal result. But, in 1837 these obstacles were removed, and I thereupon resumed the hope that I should be led to the same result which Struve grounded upon his observations of α *Lyræ*, by similar observations of 61 *Cygni*.

I selected among the small stars which surround that double star, two between the 9th and 10th magnitudes; of which one (*a*) is nearly perpendicular to the line of direction of the double star; the other (*b*) nearly in this direction. I have measured with the heliometer the distances of these stars from the point which bisects the distance between the two stars of 61 *Cygni;* as I considered this kind of observation the most correct that could be obtained, I have commonly repeated the observations sixteen times every night. When the atmosphere has been unusually unsteady, I have, however, made more numerous repetitions; although, by this, I fear the result has not attained that precision which it would have possessed by fewer observations on more favourable nights. This unsteadiness of the atmosphere is the great obstacle which attaches to all the more delicate astronomical observations. In an unfavourable climate we cannot avoid its prejudicial influence, unless by observing only on the finest nights; by which, however, it would become still more difficult to collect the number of observations necessary for an investigation. The places of both stars, referred to the middle point of the double star, are for the beginning of 1838,

	Distance.	Angle of Pos.
a	461″·617	201° 29′ 24″
b	706 ·279	109 22 10

As the instrument gives, at the same time, the distance and angle of position, I have always observed both. But the position circle is divided only into whole minutes; which, in the distance of the first star, have the value of 0″·134; in that of the second, 0″·205. Moreover, other causes exist which may render the observation of the angle of position less certain than that of the distances. I have, accordingly, considered the first of these as of less consequence in so delicate an investigation, and concentrated my attention, as far as I could, upon the latter.

The following tables contain all my measures of distance, freed from the effects of refraction and aberration, and reduced to the beginning of 1838. In these reductions, the annual variations employed of both distances are $= +4''\cdot3915$ and $-2''\cdot825$; which I have deduced (on the supposition that the stars *a* and *b* have no proper motions) from the mean motions of both stars of 61 *Cygni*, which M. Argelander had lately found by comparison of my determination (from Bradley's observations) for 1755, with his own for 1830. In the meantime, we cannot regard these variations of distance as the *true variations;* because the stars compared may have proper motions, and, also, because it is not known whether the mean of the motions of both stars of 61 *Cygni* appertains to its centre, and whether *this* (motion) is proportional to the time. In what follows, let us denote the true variations of the distances by $+4''\cdot3915+\alpha'$ and $-2''\cdot825+\beta'$, the mean distances for the beginning of 1835 by α and β; the time, reckoned from this beginning, by t; the difference of the constants of the annual parallax of 61 *Cygni*, and of the comparison-stars *a* and *b*, by α'' and β''; and, lastly, the coefficients of the parallax depending on the place of the earth by a. Then the expressions of the distances at the beginning of 1838 are—

For the star $a = \alpha + t\alpha' + a\alpha''$
For the star $b = \beta + t\beta' + a\beta''$

These expressions, as they were at the time of each observation, I have written against the observations; we can, therefore, by inspection, perceive how the observations agree with the theory.

OBSERVATIONS OF THE STAR a.

1	1837. Aug. 18	462″·050	α −0·369 α'	+0·635 α''	34	1838. May 16	461″·915	α +0·372 α'	+0·661 α''
2	19	1·619	−0·367	+0·624	35	17	2·015	+0·375	+0·680
3	20	1·693	−0·364	+0·611	36	19	1·813	+0·380	+0·701
4	28	1·726	−0·342	+0·513	37	21	1·902	+0·386	+0·721
5	30	1·940	−0·337	+0·487	38	22	1·840	+0·389	+0·730
6	Sept. 4	1·912	−0·323	+0·414	39	23	1·978	+0·392	+0·740
7	8	1·841	−0·312	+0·363	40	June 1	1·879	+0·416	+0·817
8	9	1·597	−0·309	+0·349	41	2	2·100	+0·419	+0·825
9	11	1·633	−0·304	+0·321	42	12	1·867	+0·446	+0·885
10	14	1·779	−0·296	+0·270	43	13	1·951	+0·449	+0·889
11	20	1·502	−0·279	+0·184	44	22	1·658	+0·474	+0·919
12	23	1·814	−0·271	+0·138	45	26	1·886	+0·485	+0·926
13	24	1·591	−0·268	+0·123	46	27	1·940	+0·488	+0·928
14	Oct. 1	1·614	−0·249	+0·012	47	28	2·111	+0·490	+0·928
15	2	1·760	−0·246	−0·003	48	29	2·132	+0·493	+0·928
16	16	1·708	−0·208	−0·222	49	30	2·168	+0·496	+0·929
17	28	1·512	−0·175	−0·398	50	July 1	1·790	+0·499	+0·928
18	Nov. 22	1·395	−0·107	−0·699	51	8	1·778	+0·518	+0·921
19	Dec. 1	1·321	−0·083	−0·779	52	10	1·927	+0·524	+0·917
20	30	1·233	−0·003	−0·897	53	14	1·631	+0·534	+0·910
21	31	1·306	−0·001	−0·897	54	17	1·851	+0·543	+0·892
22	1838. Jan. 8	1·168	+0·023	−0·886	55	29	1·973	+0·575	+0·825
23	10	1·226	+0·028	−0·881	56	Aug. 4	1·817	+0·592	+0·778
24	14	1·175	+0·044	−0·855	57	11	1·803	+0·611	+0·713
25	17	1·485	+0·047	−0·852	58	20	1·579	+0·636	+0·615
26	20	1·112	+0·056	−0·837	59	21	1·833	+0·638	+0·604
27	Feb. 1	1·491	+0·088	−0·751	60	25	1·707	+0·649	+0·556
28	5	1·620	+0·099	−0·715	61	26	1·770	+0·652	+0·543
29	10	1·048	+0·113	−0·665	62	29	1·812	+0·660	+0·500
30	May 3	1·675	+0·337	+0·514	63	Sept. 3	1·822	+0·674	+0·432
31	4	1·880	+0·340	+0·529	64	5	1·691	+0·679	+0·405
32	6	1·811	+0·345	+0·553	65	7	1·911	+0·685	+0·377
33	12	1·686	+0·361	+0·623	66	8	1·774	+0·687	+0·363

OBSERVATIONS OF THE STAR a (continued).

	1838.					1838.			
67	Sept. 12	461″·832	$\alpha+0{\cdot}698\,\alpha'$	$+0{\cdot}304\alpha''$	77	Sept. 23	461″·638	$\alpha+0{\cdot}728\,\alpha'$	$+0{\cdot}138\alpha''$
68	13	1·599	+0·701	+0·289	78	24	1·505	+0·731	+0·122
69	14	1·579	+0·704	+0·273	79	25	1·778	+0·734	+0·106
70	15	1·620	+0·707	+0·259	80	26	1·631	+0·737	+0·090
71	16	1·748	+0·709	+0·244	81	27	1·540	+0·739	+0·075
72	17	1·552	+0·712	+0·229	82	28	1·515	+0·742	+0·059
73	18	1·443	+0·715	+0·214	83	29	1·675	+0·745	+0·043
74	20	1·519	+0·720	+0·183	84	30	1·684	+0·748	+0·027
75	21	1·695	+0·723	+0·168	85	Oct. 1	1·436	+0·750	+0·016
76	22	1·744	+0·726	+0·153					

OBSERVATIONS OF THE STAR b.

	1838.					1838.			
1	Aug. 16	706″·572	$\beta-0{\cdot}375\,\beta'$	$+0{\cdot}436\beta''$	30	Feb. 1	706″·199	$\beta+0{\cdot}088\,\beta'$	$-0{\cdot}267\beta''$
2	18	6·434	−0·369	+0·462	31	5	6·123	+0·099	−0·326
3	19	6·783	−0·367	+0·474	32	10	6·127	+0·113	−0·398
4	20	6·684	−0·364	+0·487	33	19	5·887	+0·138	−0·519
5	28	6·147	−0·342	+0·585	34	Mar. 12	6·167	+0·195	−0·749
6	30	6·404	−0·337	+0·609	35	13	5·633	+0·198	−0·758
7	Sept. 4	6·373	−0·323	+0·653	36	May 2	6·083	+0·334	−0·861
8	9	6·650	−0·309	+0·711	37	3	6·075	+0·337	−0·857
9	11	6·296	−0·304	+0·725	38	4	6·214	+0·340	−0·852
10	14	6·567	−0·296	+0·752	39	6	6·303	+0·345	−0·842
11	20	6·594	−0·279	+0·795	40	12	6·301	+0·361	−0·806
12	23	6·517	−0·271	+0·815	41	16	6·270	+0·372	−0·778
13	24	6·354	−0·268	+0·823	42	17	6·094	+0·375	−0·771
14	Oct. 1	6·547	−0·249	+0·855	43	19	6·294	+0·380	−0·754
15	2	6·442	−0·246	+0·859	44	21	6·144	+0·386	−0·737
16	16	6·467	−0·208	+0·891	45	22	6·152	+0·389	−0·728
17	28	6·210	−0·175	+0·876	46	23	6·338	+0·392	−0·719
18	Nov. 22	6·186	−0·107	+0·718	47	June 1	6·299	+0·416	−0·625
19	Dec. 1	6·367	−0·083	+0·625	48	2	6·368	+0·419	−0·618
20	17	6·176	−0·041	+0·430	49	12	6·337	+0·446	−0·496
21	30	6·400	−0·003	+0·241	50	13	6·376	+0·449	−0·486
22	31	6·168	−0·001	+0·236	51	22	6·639	+0·474	−0·366
23	1838. Jan. 5	6·272	+0·015	+0·150	52	26	6·331	+0·485	−0·310
24	6	6·116	+0·018	+0·134	53	27	6·267	+0·488	−0·296
25	8	6·238	+0·023	+0·104	54	28	6·460	+0·490	−0·282
26	10	6·126	+0·028	+0·072	55	29	6·440	+0·493	−0·268
27	14	5·944	+0·039	+0·011	56	30	6·430	+0·496	−0·253
28	17	6·181	+0·047	−0·035	57	July 1	6·603	+0·499	−0·238
29	20	6·312	+0·056	−0·083	58	8	6·568	+0·518	−0·135

OBSERVATIONS OF THE STAR *b* (continued).

59	1838. July 10	706″·241	$\beta + 0{\cdot}524\,\beta'$	$-0{\cdot}106\,\beta''$	79	1838. Sept. 13	706″·831	$\beta + 0{\cdot}701\,\beta'$	$+0{\cdot}744\,\beta''$
60	14	6·437	+0·534	−0·046	80	14	6·696	+0·704	+0·752
61	17	6·391	+0·543	−0·000	81	15	6·899	+0·707	+0·760
62	29	6·610	+0·575	+0·179	82	16	6·743	+0·709	+0·767
63	Aug. 2	6·430	+0·586	+0·230	83	17	6·784	+0·712	+0·775
64	4	6·444	+0·592	+0·268	84	18	6·795	+0·715	+0·782
65	11	6·493	+0·611	+0·365	85	19	6·814	+0·718	+0·789
66	20	6·580	+0·636	+0·485	86	20	6·783	+0·720	+0·796
67	21	6·671	+0·638	+0·496	87	21	6·463	+0·723	+0·803
68	25	6·661	+0·649	+0·549	88	22	6·551	+0·726	+0·810
69	26	6·587	+0·652	+0·560	89	23	6·679	+0·728	+0·813
70	29	6·536	+0·660	+0·598	90	24	6·682	+0·731	+0·822
71	Sept. 3	6·299	+0·674	+0·650	91	25	6·611	+0·734	+0·827
72	4	6·391	+0·676	+0·660	92	26	6·672	+0·737	+0·833
73	5	6·394	+0·679	+0·671	93	27	6·849	+0·739	+0·839
74	6	6·645	+0·682	+0·681	94	28	6·762	+0·742	+0·844
75	7	6·741	+0·685	+0·690	95	29	6·696	+0·745	+0·848
76	8	6·517	+0·687	+0·700	96	30	6·713	+0·748	+0·852
77	12	6·475	+0·698	+0·735	97	Oct. 1	6·717	+0·750	+0·857
78	—	6·500	+0·698	+0·735	98	2	6·721	+0·753	+0·861

If we compare both divisions of these tables, we shall perceive that the agreement of the observations with each other is considerably augmented by giving to α'' and β'' positive values; or, in other words, by admitting a sensible parallax. If we consider this parallax as vanishing, the sum of the squares of the remaining differences of the eighty-five observations of the star *a* can be diminished only to 4·4487; that of the ninety-eight observations of the star *b* to 4·7108. If, however, we determine α'' and β'', so that the observations may be represented as exactly as possible, we can reduce these sums to 1·4448 and 2·4469. By this means we obtain the mean error of an observation of the star $a = \pm 0''{\cdot}1327$, of the star $b = \pm 0''{\cdot}1605$. That the observations of the second star are less accurate than those of the first, I consider to be owing to the *difference* of the directions of the two stars with respect to the direction of the double star. The way in which I conceive this difference to effect the result I shall here leave unexplained; but refer to the complete discussion, which I shall enter into at some future time, of the parallax of 61 *Cygni*.

I have employed the preceding list of the observations of the distances of the star 61 *Cygni* from *a* and *b*, in two different ways, in order to deduce from it results for the annual parallax of *α Cygni*. I have first assumed α'' and β'' as independent of each other; or, in other words, considered it as not improbable that *a* and *b* themselves may possess sensible parallax. In this way I have found, For the Star *a*.

		Mean Error.
Mean distance for the beginning of 1838	461″·6094	
Annual variation = +4″·3915−0″·0543	+4 ·3372	±0″·0398
Difference of annual parallax of 61 and *a* ... α″ =	+0 ·3690	±0 ·0283

For the Star *b*.

Mean distance for the beginning of 1838	706 ·2909	
Annual variation = −2″·825+0″·2426	−2 ·5824	±0 ·0434
Difference of annual parallax of 61 and *b* ... β″ =	+0 ·2605	±0 ·0278

The observations seem also to indicate, that the difference of the parallaxes of 61 and *b* is smaller than that of 61 and *a*; which must be the case, indeed, if *b* itself have a sensible parallax greater than *a*. The difference of the computed values of α″ and β″, in fact, exceeds the limits of the probable uncertainty of the observations; but it is to be observed that the probability of *equal* values of α″ and β″ is not so small that we should be inclined to consider the difference of the two as *proved* by the observations. Further observations will increase the weight of both results, and, at the same time, give more accurate values of the annual variations.

I have, therefore, deduced a second result from the observations, which rests on the supposition that the parallaxes of *a* and *b* are *insensible;* or that α″ and β″ are equal. For this purpose, since both series must now be brought into connexion with one another, it was necessary to deduce the *weight* of the observations contained in the second series, the weight of those in the first series being taken as unit. I have found it =0·6889; and hence the most probable value of the annual parallax of 61 *Cygni* =0″·3136. On this hypothesis, I find the mean distances of both stars for the beginning of 1838, to be 461″·6171 and 706″·2791; and the corrections of the assumed values of the annual variations, = −0″·0293 and +0″·2395. The mean error of an observation of the kind of which I have assumed the weight as unit, is ± 0″·1354, and the mean error of the annual parallax of 61 *Cygni*, = ± 0″·0202.

This hypothesis manifestly represents the observations somewhat less correctly than the first calculation which was instituted; but what we lose in this respect is not sufficient to outweigh the decided preference due to this last calculation. We can form a judgment upon this point by the following lists of errors of the observations, which contain their comparisons with two formulæ; namely, that of the first calculation and the present hypothesis. I have also added a third column, which contains the errors that arise when we assume the parallaxes α″ and β″ in the first formula as vanishing. This column also shews immediately what differences were still to be explained by the annual parallax. It shews, in fact, that these differences are commonly positive or negative, according as the coefficient of the annual parallax, which the foregoing tables give, is positive or negative.

OBSERVATIONS OF THE STAR *a*.

	I.	II.	III.		I.	II.	III.
1	+0″·19	+0″·22	+0″·42	35	+0″·17	+0″·20	+0″·43
2	−0·24	−0·21	−0·01	36	−0·03	−0·01	+0·23
3	−0·16	−0·13	+0·06	37	+0·05	+0·07	+0·31
4	−0·09	−0·06	+0·10	38	−0·02	0·00	+0·25
5	+0·13	+0·16	+0·31	39	+0·12	+0·14	+0·39
6	+0·13	+0·16	+0·28	40	−0·01	+0·02	+0·29
7	+0·09	+0·11	+0·22	41	+0·21	+0·24	+0·51
8	−0·16	−0·14	−0·03	42	−0·04	−0·02	+0·28
9	−0·11	−0·09	+0·01	43	+0·04	+0·07	+0·37
10	+0·05	+0·07	+0·15	44	−0·26	−0·23	+0·07
11	−0·19	−0·18	−0·12	45	−0·04	−0·01	+0·30
12	+0·14	+0·15	+0·19	46	+0·01	+0·05	+0·36
13	−0·08	−0·07	−0·03	47	+0·19	+0·22	+0·53
14	−0·01	−0·01	−0·01	48	+0·21	+0·24	+0·55
15	+0·14	+0·14	+0·14	49	+0·24	+0·27	+0·59
16	+0·17	+0·16	+0·09	50	−0·14	−0·10	+0·21
17	+0·04	+0·03	−0·11	51	−0·14	−0·11	+0·20
18	+0·04	−0·01	−0·22	52	+0·01	+0·04	+0·35
19	0·00	−0·06	−0·29	53	−0·28	−0·26	+0·05
20	−0·05	−0·10	−0·38	54	−0·06	−0·03	+0·27
21	+0·03	−0·03	−0·30	55	+0·09	+0·11	+0·39
22	−0·11	−0·17	−0·44	56	−0·05	−0·03	+0·24
23	−0·06	−0·11	−0·38	57	−0·04	−0·02	+0·23
24	−0·12	−0·17	−0·43	58	−0·22	−0·21	+0·01
25	+0·19	+0·14	−0·12	59	+0·04	+0·05	+0·25
26	−0·19	−0·24	−0·49	60	−0·07	−0·06	+0·13
27	+0·16	+0·11	−0·11	61	0·00	0·00	+0·20
28	+0·28	+0·23	+0·02	62	+0·05	+0·06	+0·24
29	−0·31	−0·36	−0·55	63	+0·09	+0·09	+0·25
30	−0·10	−0·09	+0·08	64	−0·03	−0·03	+0·12
31	+0·10	+0·11	+0·30	65	+0·20	+0·20	+0·34
32	+0·02	+0·03	+0·22	66	+0·07	+0·06	+0·20
33	−0·13	−0·12	+0·10	67	+0·15	+0·14	+0·26
34	+0·08	+0·10	+0·33	68	−0·08	−0·09	+0·03

OBSERVATIONS OF THE STAR *a* (continued).

	I.	II.	III.		I.	II.	III.
69	−0″·09	−0″·10	+0″·01	78	−0″·11	−0″·13	−0″·06
70	−0·05	−0·06	+0·05	79	+0·17	+0·15	+0·21
71	+0·09	+0·08	+0·18	80	+0·03	+0·01	+0·06
72	−0·10	−0·12	−0·02	81	−0·06	−0·08	−0·03
73	−0·21	−0·22	−0·13	82	−0·08	−0·10	−0·05
74	−0·12	−0·13	−0·05	83	+0·09	+0·07	+0·11
75	+0·06	+0·05	+0·12	84	+0·11	+0·08	+0·11
76	+0·12	+0·10	+0·17	85	−0·14	−0·16	−0·13
77	+0·02	0·00	+0·07				

OBSERVATIONS OF THE STAR *b*.

	I.	II.	III.		I.	II.	III.
1	+0·26	+0·24	+0·37	27	−0·36	−0·35	−0·36
2	+0·11	+0·10	+0·23	28	−0·11	−0·10	−0·12
3	+0·46	+0·44	+0·58	29	+0·03	+0·05	+0·01
4	+0·35	+0·34	+0·48	30	−0·04	−0·02	−0·11
5	−0·21	−0·23	−0·06	31	−0·11	−0·08	−0·19
6	+0·04	+0·02	+0·20	32	−0·09	−0·05	−0·19
7	−0·01	−0·03	+0·16	33	−0·30	−0·26	−0·44
8	+0·25	+0·22	+0·43	34	+0·02	+0·08	−0·17
9	−0·11	−0·14	+0·08	35	−0·51	−0·45	−0·71
10	+0·15	+0·12	+0·35	36	−0·06	−0·01	−0·29
11	+0·16	+0·13	+0·37	37	−0·08	−0·02	−0·30
12	+0·08	+0·05	+0·29	38	+0·06	+0·12	−0·16
13	−0·09	−0·12	+0·13	39	+0·15	+0·21	−0·07
14	+0·09	+0·06	+0·32	40	+0·13	+0·19	−0·08
15	−0·01	−0·05	+0·21	41	+0·10	+0·15	−0·11
16	−0·01	−0·04	+0·23	42	−0·09	−0·03	−0·29
17	−0·27	−0·30	−0·04	43	+0·11	+0·16	−0·09
18	−0·27	−0·29	−0·08	44	−0·05	0·00	−0·24
19	−0·07	−0·09	+0·10	45	−0·04	+0·01	−0·23
20	−0·22	−0·23	−0·11	46	+0·14	+0·19	−0·05
21	+0·05	+0·05	+0·11	47	+0·07	+0·12	−0·09
22	−0·16	−0·17	−0·10	48	+0·14	+0·18	−0·03
23	−0·06	−0·06	−0·02	49	+0·07	+0·11	−0·05
24	−0·21	−0·21	−0·18	50	+0·10	+0·14	−0·02
25	−0·09	−0·08	−0·06	51	+0·33	+0·36	+0·23
26	−0·19	−0·18	−0·17	52	0·00	−0·03	+0·08

OBSERVATIONS OF THE STAR *b* (continued).

	I.	II.	III.		I.	II.	III.
53	−0″·06	−0″·04	−0″·14	76	−0″·12	−0″·15	+0″·06
54	+0·12	+0·15	+0·05	77	−0·18	−0·20	+0·02
55	+0·10	+0·13	+0·03	78	−0·15	−0·18	+0·04
56	+0·08	+0·11	+0·02	79	+0·18	+0·15	+0·37
57	+0·25	+0·28	+0·19	80	+0·04	+0·01	+0·23
58	+0·19	+0·21	+0·15	81	+0·24	+0·21	+0·43
59	−0·15	−0·13	−0·18	82	+0·08	+0·05	+0·28
60	+0·03	+0·04	+0·02	83	+0·12	+0·09	+0·32
61	−0·03	−0·02	−0·03	84	+0·13	+0·10	+0·33
62	+0·13	+0·14	+0·18	85	+0·14	+0·11	+0·35
63	−0·06	−0·06	0·00	86	+0·11	+0·08	+0·32
64	+0·06	−0·06	+0·01	87	−0·21	−0·24	0·00
65	−0·04	−0·05	+0·05	88	−0·13	−0·16	+0·08
66	+0·01	0·00	+0·13	89	0·00	−0·03	+0·21
67	+0·09	+0·08	+0·23	90	0·00	−0·03	+0·21
68	+0·07	+0·06	+0·21	91	−0·07	−0·10	+0·14
69	−0·01	−0·02	+0·14	92	−0·02	−0·05	+0·20
70	−0·07	−0·09	+0·09	93	+0·16	+0·13	+0·38
71	−0·32	−0·34	−0·16	94	+0·07	+0·04	+0·29
72	−0·24	−0·26	−0·06	95	0·00	−0·03	+0·22
73	−0·24	−0·26	−0·06	96	+0·02	−0·01	+0·24
74	+0·01	−0·01	+0·19	97	+0·02	−0·01	+0·24
75	+0·10	+0·08	+0·28	98	+0·02	−0·01	+0·25

As the mean error of the annual parallax of 61 *Cygni* (=0″·3136) is only ± 0″·0202, and consequently not $\frac{1}{15}$ of its value computed; and as these comparisons shew that the progress of the influence of the parallax, which the observations indicate, follows the theory as nearly as can be expected considering its smallness, we can no longer doubt that this parallax is sensible. Assuming it 0″·3136, we find the distance of the star 61 *Cygni* from the sun 657700 mean distances of the earth from the sun: light employs 10·3 years to traverse this distance. As the annual proper motion of α *Cygni* amounts to 5″·123 of a great circle, the *relative* motion of this star and the sun must be considerably more than sixteen semidiameters of the earth's orbit, and the star must have a constant aberration of more than 52″. When we shall have succeeded in determining the elements of the motion of both the stars forming the double star, round their common centre of gravity, we shall be able also to determine the sum of their masses. I have attentively considered the preceding observations of the relative positions; but I consider them as yet very inadequate to afford the elements of the orbit. I consider them sufficient only to shew that the annual angular motion is somewhere about $\frac{2}{3}$ of a degree; and that the distance, at the beginning of this century, had a minimum of about 15″. We are enabled hence to conclude that the time of a revolution is more than 540 years, and that the semi-major axis of the orbit is seen under an angle of more than 15″. If, however, we proceed from these numbers, which are merely *limits*, we find the sum of the masses of both stars less than half the sun's mass. But this point, which is deserving of attention, cannot be established until the observations shall be sufficient to determine the elements accurately. When long-continued observations of the places which the double star occupies amongst the small stars which surround it, shall have led to the knowledge of its centre of gravity, we shall be enabled to determine the two masses separately. But we cannot anticipate the time of these further researches.

I have here troubled you with many particulars; but I trust it is not necessary to offer any excuse for this, since a correct opinion as to whether the investigation of the parallax of 61 *Cygni* has already led to an approximate result, or must still be carried further before this can be affirmed of them, can only be formed from the knowledge of those particulars. Had I merely communicated to you the result, I could not have expected that you would attribute to it that certainty which, according to my own judgment, it possesses. I have the honour to be, esteemed Sir, yours,

F. W. Bessel.

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