IRIS.

1853.	Hamburg M. T.	⑦ α	Log. Factor of Parallax.	⑦ δ	Log. Factor of Parallax.	No. of Comp.	Apparent Places of Comparison-Stars by Meridian Observations.	
	h. m. s.	° ′ ″		° ′ ″			h. m. s.	° ′ ″
March 28	9 8 32.3	177 8 53.1	9.5238*n*	—7 48 48.2	9.9366	6	11 50 16.26	—7 43 59.2
29	10 16 47.1	176 55 0.8	9.3663*n*	7 41 34.3	9.9391	9	11 50 16.26	7 43 59.3
30	9 45 3.0	176 42 9.7	9.3734*n*	7 34 19.2	9.9385	7	11 46 28.69	7 34 35.5
31	9 37 46.6	176 29 22.1	9.3693*n*	7 27 56.4	9.9381	8	{ 11 43 41.35 { 11 45 6.87	7 10 32.4 —7 27 7.2
April 5	10 45 22.0	175 27 15.3		—6 53 3.5	9.9387		Meridian.	

TWENTY-FIFTH ASTEROID.

Professor Petersen has communicated the following observations of this planet, — made by Mr. Luther in Bilk, and Professor Rümker in Hamburg.

1853.	M. T. Bilk.	㉕ α	㉕ δ	No. Comp.	✱ α	✱ δ	Authority.
	h. m. s.	° ′ ″	° ′ ″		° ′ ″	° ′ ″	
May 2	10 0 8.5	220 13 41.3	—9 48 50.3	11	220 42 35.0	—9 47 35.9	B. Z. 243.
4	12 53 35.6	219 45 56.5	—9 10 19.9	10	218 27 30.3	—9 10 47.5	B. Z. 244

1853.	M. T. Hamburg.	㉕ α	㉕ δ
	h. m. s.	° ′ ″	° ′ ″
May 18	10 58 45.2	218 4 14.8	—6 48 14.3

It has also been observed by Mr. Ferguson in Washington as follows: —

1853.	M. T. Washington.	No. of Obs.	✱	㉕ — ✱ Δα	㉕ — ✱ Δδ	㉕ α	㉕ δ
	h. m. s.			m. s.	′ ″	h. m. s.	° ′ ″
June 5	9 44 7.1	17	Weisse XI. 233	+1 18.68	+14 22.96	11 15 19.79	+5 15 15.48

G.

SIXTH NOTE ON THE DOUBLE STARS.

By Mr. YVON VILLARCEAU.

η Coronæ Borealis.

Those double stars whose elements may be regarded as known, at least approximately, are four in number. These are *ξ Ursæ Majoris*, *p Ophiuchi*, *ζ Herculis*, and *η Coronæ*.[1] This number would still farther be reduced to three, provided the double solution to which I have called attention[2] could continue at the present time. The object of the present note is to determine which one of these two solutions of the orbit of *η Coronæ* should be definitively adopted.

As will be remembered, the ambiguity which we have found arises from the fact, that the two components of the system are physically so little dissimilar that they can only be distinguished from one another by their relative positions. This distinction — although possible when relative positions are compared which are but slightly different, or separated by a short interval of time — ceases to be so, when the positions are referred to widely separated epochs, between which no observations were made. This difficulty presents itself in the case of two observations of W. Herschel made in 1781 and 1802, and consequently at an interval of 21 years; and the same interval of time separates the latter from the epoch 1823, when the series of observations commenced which has been continued without interruption up to the present time. Ought the observations of W. Herschel to be used as they were given at first, or should they be reversed, that is to say, changed by 180°? The condition that they must be capable of being represented by a system of elements which will also represent the modern observations, is the only one which can remove this difficulty.

Now, in preserving the position of 1802, I have found it necessary to reverse that of 1781, and have thus arrived at an orbit characterized by a revolution of about 66 years, and which no one had suspected. On the other hand, reversing the observation of 1802 and preserving unchanged that of 1781, I have obtained an orbit giving a revolution of nearly 43 years, — being the orbit which Sir John Herschel and Mr. Mädler had already pointed out, and which has been repeated from these astronomers in the greater part of the works which treat of this matter.

I have shown, in my first communication upon *η Coronæ*,

[1] See Humboldt's *Kosmos*, Vol. III. pp. 254, 258 and ff.

[2] *Comptes Rendus*, Vol. XXVIII. No. 13, Session March 26, 1849; *Add. à la Conn. d. Temps*, 1852.

that the result of the comparison of these two orbits with observations was incapable of establishing any sufficient motive for preference of either the one or the other of these two solutions. But a minute discussion of the physical circumstances of the two observations of W. HERSCHEL showed the probabilities to be in favor of the orbit of 66 years. But however strong these probabilities might be, it would nevertheless be proper to refer to another epoch the question of deciding between these two solutions. We fixed for this epoch that at which the observations of *η Coronæ* in 1853 should be made, — pointing out the possibility of separating the two orbits before this time, in case the power of the great Pulkowa telescope should permit observations to be continued in spite of the great proximity of the component stars. As it is, the observations in Russia have been continued up to the present time, and the interest awakened by this subject has induced Messrs. LASSELL and HARTNUP to make observations in England, which they have had the goodness to communicate. Mr. DAWES has also shown me the courteous attention of transmitting a series of unpublished observations, which extend for *η Coronæ* as far as 1849 inclusive. These circumstances prompt me to present at the present time the results to which I have been conducted concerning the choice to be made between the two orbits; while at the same time I have profited by the new observations, to apply to the elements of the definitive orbit a correction, the opportunity for which I pointed out in closing my former communication.

At the first glance, it was easy to perceive that the series of observations made since 1847 could not accord with an orbit having a period of 43 years; and I have therefore given my attention to correcting the elements of the 66-year orbit. A difficulty here presented itself, which the insufficiency of the date prevented me from encountering in my first investigation, and which I had already experienced in the investigation of the orbit of *η Herculis*, though with a less marked character. I allude to the employment of distances in determining the elements of orbits of so close stars. In determining the elements of *ζ Herculis* by means of angles of position alone, I found it possible[1] to represent these angles well, — but the distances manifested systematic errors; making use of angles of position and of distances at the same time, the latter were represented better, but the systematic errors appeared in the angles of position.

In my new investigations concerning *η Coronæ*, an attempt to correct the elements by means of the simultaneous employment of the angles of position and of the distances, furnished me elements which leave, in the comparison of the angles of position, systematic errors which are very marked, and inadmissible when we consider the great precision with which angles of position are measured. I have consequently taken the course of employing these latter solely, and reserved the measurements of distances for the determination of the semiaxis major only. In this connection I will remark that five measurements of distance obtained by Mr. W. STRUVE between 1826 and 1835 exceed 0″.7; while seventeen other measurements obtained subsequently by the same astronomer and by MM. OTTO STRUVE and MÄDLER are comprised between 0″.6 and 0″.4. When it is desired to deduce other elements beside the semiaxis major from the measured distances, the results will depend especially upon the variations of distance, and it is manifest that the variations of distance comprised between 0″.6 and 0″.4 are quantities altogether comparable to the errors with which measures so difficult to obtain can be affected. As for the five other distances comprised between 0″.7 and 1″.15, the employment of their variations presents still other difficulties, to the consideration of which we will return in a moment. I have for these reasons felt obliged to employ only angles of position in the correction of elements other than the semiaxis major.

The following are the considerations which have guided me in deducing the semiaxis major.

The observations of MM. STRUVE can be grouped in two very distinct series, from two different points of view. The first, a series of eight measures, comprises those which Mr. STRUVE the father made at Dorpat between 1826 and 1838. The other includes twelve observations made for the most part by Mr. OTTO STRUVE at Pulkowa, from 1839 to 1852. These two series are distinguished from one another as having been made by different observers, and also as having been made by the aid of different instruments. Two measures of distance are by Mr. MÄDLER, who obtained them in 1840 and 1841 with the Dorpat instrument.

In making use of the series of observations by Mr. STRUVE at Dorpat, I have had regard to the remarks of this eminent astronomer in the *Mensuræ Micrometricæ*, p. CLIII. Mr. STRUVE, after reminding that the distance 0″.7 is too small to be measured by bisecting the two stars, shows that the very small distances below 0″.8 are not measured, properly speaking, but are rather estimated, according to the processes which he describes. By an attentive examination he has found proof that the accidental errors of such an estimate do not exceed those which are to be apprehended in the measures of distances comprised between 1″ and 2″. Nevertheless, the distances obtained by estimate deserve according to him less confidence. The small discrepancies of the estimates rather prove constancy of judgment than truth in the result obtained, and especially if the spaces to be compared are dissimilarly terminated. For this reason Mr. STRUVE instituted experiments upon artificial double stars of different apparent diameters, at angular distances of from 0″.22 to 0″.81, to determine the mean value of errors committed in estimating the distances. After giving a table containing the results of his experiments, Mr. STRUVE adds, that, according to his conviction, the estimate of the dis-

[1] *Additions to the Connaissance des Temps, for* 1852.

tances of very close celestial stars is made in the same manner as that of artificial stars. He entertains no doubt that the corrections of the table ought to be applied to distances smaller than 1″, and it does not appear probable to him that the errors affecting the distances thus corrected would attain the limit 0″.1.

In the presence of statements so precise as these, and emanating from the author himself of the observations which I had to employ, I have not hesitated to apply the corrections indicated; but to facilitate the interpolation, I have substituted for Mr. STRUVE's another table, deduced by graphical interpolation from the numbers contained in that of Mr. STRUVE. The two tables are, as will be seen, but slightly different, and the only advantage of mine consists in a continuity which Mr. STRUVE's table does not possess to the same extent. The two tables are as follows: —

Distance Estimated.	Correction according to Mr. STRUVE.	Correction obtained graphically.	Distance Estimated.	Correction according to Mr. STRUVE.	Correction obtained graphically.
0″.30	+0″.13	+0″.128	0″.65		+0″.069
0.35		0.125	0.70	+0″.06	0.055
0.40	+0.12	0.120	0.75		0.042
0.45		0.113	0.80	+0.03	0.030
0.50	+0.10	0.105	0.85		0.018
0.55		0.094	0.90	+0.01	0.010
0.60	+0.07	0.082	0.95		+0.004
0.65		+0.069	1.00	0.00	0.000

In fact, we can perceive that the greatest discordance between the two tables does not reach 0″.01.

The corrections here indicated ought not to be regarded as definitive, for MM. STRUVE have not ended their experimental researches, and it may moreover be remarked, that the observations which have furnished the corrections for distances comprised between 0″.6 and 1″.0 are perhaps not sufficiently numerous.

The series of distances comprised between 0″.4 and 0″.6, and observed by Mr. OTTO STRUVE at Pulkowa, suggests a difficulty. Ought we or ought we not to apply to these observations the corrections given in the preceding table? This table was deduced by Mr. STRUVE the father, from his own observations made at Dorpat. The want of identity of the observers does not seem to oppose the application of the table to the second series, since the error of the estimate is attributed to the dissimilarity of the limits which bound the spaces compared. On the other hand, the instruments at Dorpat and Pulkowa are mounted under conditions differing but slightly, and eyepieces of about the same optical power are used with them. The most serious objection which can be urged against the use of Mr. STRUVE's table is relative to the somewhat uncertain portion of estimate and of direct measurement in the distances obtained by Mr. OTTO STRUVE. However this may be, the series of distances of η *Coronæ* furnished by this astronomer cannot be reconciled with those of Mr. W. STRUVE without corrections either constant or variable.

In the absence of positive data, and as an experiment, I decided to apply to the observations of distance by Mr. OTTO STRUVE corrections deduced from the preceding table, so that the result obtained by the employment of these distances can be admitted only upon the condition of being verified in some other way. Moreover, it is almost unnecessary to call attention to the fact, that it is only the determination of the semiaxis major which is here under discussion.

As for the two distances observed by Mr. MÄDLER with the Dorpat telescope, it is manifest from what has been said, that we can apply to them STRUVE's corrections. This I have done.

Finally, I have taken, in determining the semiaxis major, no account of three distances observed, one by Sir JOHN HERSCHEL and the two others by Mr. DAWES, inasmuch as the differences between the distances as measured by these astronomers and those of Mr. STRUVE did not appear to me to be determined with sufficient exactitude in the case where these distances are very small. We will return to the observations of Mr. DAWES shortly.

The observations of angles of position which I have employed to correct the elements of the orbit of η *Coronæ* are 37 in number, and comprise all those which have come to my knowledge. The equations of condition have been treated by the method of least squares, and have conducted me to the following elements (the semiaxis major excepted): —

ELEMENTS OF THE ORBIT OF η *CORONÆ BOREALIS.*

$$\left.\begin{array}{l}\alpha = 15^{h.}\ 17^{m.}\ 0^{s.} \\ \delta = +30^{\circ}\ 50'\end{array}\right\}\ 1850.$$

Perihelion Passage, ...	1779.338; 1846.647
Mean yearly Motion, . . .	5°.3484
Angle (sin = eccentricity), . .	23° 51′.0
Longitude of Ascending Node, .	9 52.3
Longitude of Perihelion, . .	194 51.9
Inclination, ...	± 59 18.6
Semiaxis major, ...	1″.2015

The longitudes are counted from the meridian of 1850 (yearly motion = —0′.294).

Hence we obtain

Period of Revolution, ...	67y..309
Eccentricity, ...	0′.40433

	Dates.	Position.	Distance.
Smallest apparent perihel.,	1786.068 ; 1853.377	264° 53′	0″.4830
Largest " aphel.,	1811.942 ; 1879.251	11 5	1.6851
Largest " perihel.,	1771.431 ; 1838.740	116 20	0.5159
Smallest " aphel.,	1778.744 ; 1846.053	188 15	0.7170
The angles of position are counted from the meridian of 1850.			

These elements, compared with those which I published in the *Additions* to the *Conn. des Temps*, present but slight differences; — the greatest angular difference, namely, that of the position of the node, is 5° 31′; the period of revolution has been increased by one year, and the time of the perihelion passage by about three months.

Before going on to state the manner in which the semiaxis major has been obtained, let me give the result of the comparisons of all the observations with these corrected elements.

η Coronæ.

Comparison of the Elements with all the Observations.

Observations.					Observers.	Correction of Distances.	Corrected Distances.	Ratio of the Distance to the Semiaxis Major deduced from the Elements.	Angle of Position. Observed — Calculated.		Corrected *minus* Calculated Distance.
Date.	Angles of Position.	Distance.	Mean Magnif. Power.	No. of Days.					Angle.	In Arc.	
1781.69	210° 41′		932?	1	W. Herschel.			0.5346	—0° 12′	—0″.002	
1802.69	359 40			1	Id.			1.2406	+1 5	+0.028	
1823.27	25 57			2	J. Herschel and South.			1.1681	—1 33	—0.038	
1826.77	35°.28	1″.154 (1)	600	4 and 3	W. Struve.	0″.000	1″.154	1.0060	+0 24	+0.008	—0″.055
1829.55	43.25	0.960	600	2	Id.	+0.003	0.963	0.8527	+0 19	+0.006	—0.061
1830.303	44 28	0.820			J. Herschel.	0	0.820	0.8084	—1 11	—0.020	(—0.151)
1831.36	51 12				Dawes.			0.7452	+1 10	+0.018	
1831.42	52 30			10	J. Herschel.			0.7416	+2 12	+0.034	
1831.63	50.63	0.883	600	3	W. Struve.	+0.012	0.895	0.7290	—0 38	—0.010	+0.019
1832.48	56 42			10	J. Herschel.			0.6779	+1 8	+0.016	
1832.55	56 42				Dawes.			0.6738	+0 45	+0.011	
1832.76	56.87	0.790	933	3	W. Struve.	+0.032	0.822	0.6613	—0 14	—0.003	+0.027
1833.28	62 6			8	J. Herschel.			0.6307	+1 53	+0.025	
1833.39	63 31				Dawes.			0.6243	+2 36	+0.034	
1835.41	74.28	0.730	900	6	W. Struve.	+0.047	0.777	0.5163	—2 23	—0.026	+0.157
1836.52	88.77	0.563	967	6	Id.	+0.091	0.654	0.4703	+0 39	+0.006	+0.089
1837.47	95.44	0.385	900	4	W. and O. Struve.	+0.122	0.507	0.4432	—4 7	—0.038	—0.025
1838.44	107.04	0.366	1000	5	Id.	+0.123	0.489	0.4302	—5 17	—0.048	—0.028
1839.82	127.05	0.586	609	3	O. Struve.	+0.085	0.671	0.4390	—3 45	—0.035	+0.144
1840.52	137.80	0.518	1036	6	Id.	+0.101	0.619	0.4542	—1 46	—0.017	+0.073
1841.43	150 24	0.480			Mädler.	+0.108	0.588	0.4815	+0 25	+0.004	+0.010
1841.50	151.25	0.522	936	4	O. Struve.	+0.100	0.622	0.4838	+0 31	+0.005	+0.041
1842.21	157 58.5	0.5			Mädler.	+0.105	0.605	0.5084	+0 1	0.000	—0.006
1843.30	165.00	0.570	858	3	O. Struve.	+0.089	0.659	0.5460	—2 44	—0.031	+0.003
1845.61	183.13	0.577	910	5	W. and O. Struve.	+0.087	0.664	0.5953	—2 2	—0.025	—0.051
1846.61	193.93	0.557	858	3	O. Struve.	+0.087	0.644	0.5943	+1 45	+0.022	—0.070
1846.88	196 46		435		Dawes.			0.5914	+2 41	+0.033	
1847.64	201.78	0.495	858	5	O. Struve.	+0.106	0.601	0.5775	+2 8	+0.026	—0.093
1848.00	204.05	0.658	476	4	Dawes.	0	0.658	0.5681	+1 41	+0.020	(—0.025)
1848.72	207.80	0.495	1013	2	O. Struve.	+0.106	0.601	0.5449	—0 22	—0.004	—0.054
1849.44	218.28	0.694	500	2	Dawes.	0	0.694	0.5173	+3 45	+0.041	(+0.073)
1849.65	214.63	0.517	858	3	O. Struve.	+0.101	0.618	0.5087	—1 54	—0.020	+0.007
1850.52	221.50	0.437	936	4	Id.	+0.114	0.551	0.4727	—4 3	—0.040	—0.017
1851.35	236 37			2	Hartnup.			0.4411	+1 7	+0.010	
1851.40	239 18			3	Lassell.			0.4394	+3 9	+0.029	
1851.56	233.26	0.412	1076	10	O. Struve.	+0.118	0.530	0.4340	—5 0	—0.045	+0.009
1852.62	257.98	0.402	1065	6	Id.	+0.120	0.522	0.4080	+4 41	+0.040	+0.032

N. B. — Those numbers in the last column which are included in parentheses refer to distances which were not used in the determination of the semiaxis major.

Let me now describe the manner in which I have determined the semiaxis major. The other elements obtained by means of the angles of position alone have made it possible to compute the several values of the ratio of the distance to the semiaxis major.

Let ϱ' be this ratio; A, the semiaxis major; and ϱ, the distance observed and corrected conformably to the indications of Mr. Struve. We have then for every observation of distance an equation of the form $\varrho = \varrho' A$.

Discussing according to the method of least squares the whole system of equations which depend upon the observations of Mr. W. Struve, then in the same manner those of Mr. Otto Struve and those of Mr. Mädler, I have obtained the following three equations: —

(1) The mean 1″.154 differs from the number 1″.075 published in the *Mensuræ Micrometricæ*. I have obtained the former by suppressing one of the four observations (0″.84) which appeared too different from the others, and then referring the observations retained to the mean epoch 1826.77, taking account of the variations of the distance with reference to the time.

By 8 observations of Mr. W. Struve,	$4''.3217 = 3.5770\,A$,	whence $A = 1.2082$
" 12 " " O. Struve,	$3.7067 = 3.1063\,A$,	" $A = 1.1933$
" 2 " " Mädler,	$0.5908 = 0.4903\,A$,	" $A = 1.205$
By the whole 22 observations,	$8.6192 = 7.1736\,A$,	whence $A = 1.2015$

The greatest difference of any one of these three determinations from the final result amounts only to 0″.008; and so close an agreement would tend to justify the application which I have made to the observations of MM. O. Struve and Mädler, of the corrections which could be only legitimately applied to the observations of Mr. Struve the father.

As for the difference between the values of the semiaxis major corresponding to MM. Struve, I find it here to be 0″.015. It has the same sign and is precisely equal to the difference which I pointed out[1] between the values of the semiaxis major of the orbit of *p Ophiuchi*, relative to these two observers. In the latter case, the quantity under consideration was about 5″, and as all the distances exceeded 1″ they had no need of any correction. But at any rate, the exact coincidence which we find here should be regarded as purely accidental; in fact, the change of one of the distances by a few hundredths of a second would suffice to destroy this perfect coincidence.

Taking the corrections applied to the twelve distances of Mr. Otto Struve and the corresponding differences between the corrected observation and calculation, we find their sums to be 1″.214 and 0″.024, and their means respectively +0.101 and +0.002. If we admit that the accuracy of the value of the semiaxis major is sufficiently proved by the smallness of the discrepancies between the partial results and the mean result, we find as a consequence that the mean correction to be applied to the distances as observed by Mr. Otto Struve between the limits 0″.4 and 0″.6 is 0″.099, or very nearly the tenth of a second. The variations of the corrections employed between these limits do not exceed 0″.02 from this mean, whence it would follow that the errors of Mr. O. Struve between these limits are sensibly constant. To be sure, these are but presumptions, and especially submitted for the examination of the skilful astronomer to whose courtesy we are indebted for the communication of this series of observations.

We have thus far omitted the consideration of the two measures of distance obtained by Mr. Dawes, because the smallness of the optical power of his instrument, as compared with those of Dorpat and Pulkowa, would lead us to consider the measures of minute distances as hardly comparable to those which have been obtained in Russia. Nevertheless, the errors +0″.025 and +0″.073, deduced from a value of the semiaxis major obtained without the aid of Mr. Dawes's observations, show that the observations of this distinguished astronomer are not so far from being comparable to those of MM. Struve as might at first have been apprehended. The semiaxis major which the two measures of Mr. Dawes give is 1″.241, a value which only differs by 0″.040 from our general mean. Still it is necessary to remark, that, as this result is deduced from observed quantities which are nearly one half less than the results obtained, the influence of the errors of observation is almost doubled.

[1] *Add. à la Conn. des Temps*, 1852, p. 197.

In spite of the quite remarkable accordance of the values of the semiaxis major, it must be acknowledged that the errors of the corrected distances are far from attaining the same degree of smallness as the errors with which the angles of position are affected. Independently of what doubt might remain concerning the legitimateness of the corrections applied, the result of the comparison of the distances[1] shows that we ought to hold to the use of the angles of position in determining the principal elements of the orbit.

Casting a glance at the differences relative to the angles of position given in the preceding table, it will be remarked that the largest of these differences when reduced to arc amounts to only 0.″048. The whole series gives for the probable error of an angle of position, expressed in the same manner, the number 0″.0188. Now Mr. Struve has shown that the probable error of the mean of three observations of an angle of position reduced to arc varies from 0″.018 to 0″.028 for the distances comprised between 0″.70 and 1″.48. The preceding result accords very well with the experimental determinations of Mr. Struve.

Our table appears to show traces of a systematic error between the epochs 1837 and 1840. It will be observed that this epoch includes an apparent perihelion passage, and moreover, that there are no observations but those of MM. Struve. Between 1846 and 1848 some errors with the same sign are to be found, but these are very slight. Finally, the somewhat sensible errors of the last two observations, which amount respectively to −0″.045 and +0″.040 can be attributed to the very great proximity of the stars, for the companion is approaching the apparent perihelion, which will be reached in 1853.377, the distance being reduced at this time to 0″.484.

The traces of systematic errors of which I have spoken cannot entirely disappear until the astronomers shall have themselves determined, by observations or special experiments, the law of the errors which affect the angles of position according to the angle formed with the horizon by the straight line which joins the images of the stars. We have reason to

[1] With regard to the observation of 1839, it ought to be remarked, according to Mr. Otto Struve, that the observations of this year cannot be taken into consideration, because it was in 1839 that he began to apply himself to micrometrical measures, and that his observations made at that time could not claim the precision which experience has since enabled him to attain. Therefore the deviation +0″.144 of the distance measured in 1839 ought not to surprise us.

hope that MM. Struve will soon communicate the result of their researches upon this subject.

In spite of the discordances which still exist in the comparison of the angles of position, we may consider our elements as representing the observations in a very satisfactory manner. It remains to state how they are satisfied by the orbit of 43 years. I confine myself to the comparison of the last two observations of Mr. Otto Struve, with the elements (second solution) published in the *Additions* to the *Conn. des Temps.*

The result of the comparison is

Date.	Angle Obs. — Angle Calc.	Dist. Obs. — Dist. Calc.	Cor. Dist. — Dist. Calc.
1851.56	—104° 7′	—0″.035	+0″.083
1852.62	— 91 30	—0.213	—0.093

We shall have a more approximate value for the discordance between the two orbits as regards the angles of position, if we correct the observations of Mr. Otto Struve by the errors indicated by the preceding comparison. We thus obtain for the difference between the observed and the calculated angles

Date.	
1851.56	—99° 7′
1852.62	—96 11

or about —97° 5′ for the beginning of 1852. Now such a discordance is not one which can be made to disappear by slight changes in the elements, and we are therefore justified in rejecting the orbit of 43 years' period, and in considering the orbit of 67 years as being that which the companion of η *Coronæ* really describes.

The period of revolution 67^y.309 does not appear to me susceptible of being materially modified by later observations, inasmuch as the position corresponding to the observation of Sir W. Herschel has been reached and passed during the last few years. The period cannot therefore be affected by any uncertainty greater, at the most, than the time during which an angle of position would be described equal to the algebraic difference between the mean error of the modern observations and that of the observation of W. Herschel. It is readily seen, that this uncertainty cannot exceed a year. Now the period 66^y.257 satisfies all the observations anterior to 1848, and it is therefore manifest that, if the true time of a revolution exceeds 67.309, it can be but by a small fraction of a year.

Let me add in closing, that having applied to the observations of MM. Struve alone the method set forth in my third memoir upon the double stars, without subjecting them to any corrections dependent upon the distances, I obtained immediately an orbit, a little indeterminate it is true, but in which the period of revolution was 69^y.3. Thus, without recurring to the ancient observation of Herschel, the series of observations of MM. Struve is already sufficient to give a tolerably approximate idea of the orbit of η *Coronæ.*

Paris, 1853, *March* 30.

LETTER FROM MR. CHARLES S. VENABLE TO THE EDITOR.

Bonn, 1853, *May* 16.

I take the liberty of a fellow-citizen to communicate to you, at Professor Argelander's request, the discovery of a planet by Mr. Luther in the Observatory of Bilk, together with several positions of the same.

	M. T. Bilk. h. m.	App. R.A.	App. Decl.
1853, May 5	13 0	207° 40′	—10° 15′
14	11 52	206 3	— 9 57

	M. T. Bonn. h. m. s.	App. R.A.	App. Decl.
1853, May 15	12 0 41	205° 53′ 41″	—9° 55′ 46″.5

The Bonn position is obtained from four comparisons with the ring-micrometer.

I send also Elements and an Ephemeris of the planet discovered by Gasparis on the 6th of April. They are computed by Messrs. Förster and Krüger here in Bonn.

Elements of the Twenty-Fourth Asteroid.

From observations in Naples, April 6 and 13, and Bonn, April 27 and May 10.

Epoch, 1853, May 10.431400, Mean Berlin Time.

M	341° 52′ 26″.3	Mean Equinox, 1853.0.
☊	32 26 35.3	
π	213 32 44.2	
ω	181 6 8.9	
i	0 53 46.8	
φ	14 21 14.2	
Log. a	0.561038	
" μ	2.708450	

The observations are represented by these elements as follows: —

	C. — O. $\Delta\lambda$	C. — O. $\Delta\beta$		C. — O. $\Delta\lambda$	C. — O. $\Delta\beta$
April 6	—0″.4	+31″.6	April 27	+1″.0	— 0″.8
13	—0.2	— 0.9	May 10	+0.1	—18.3

Ephemeris for Mean Berlin Midnight.

1853.	㉔ α h. m. s.	㉔ δ ° ′ ″	Log △
May 20	11 5 17.7	+6 18 12	0.37289
21	5 47.9	14 39	
22	6 19.2	10 59	
23	6 52.0	7 13	
24	7 25.6	6 3 19	0.38133
25	8 0.4	5 59 18	
26	8 36.3	55 10	
27	9 13.3	50 57	
28	9 51.2	46 35	0.38965
29	10 30.3	42 8	
30	11 10.1	37 35	
31	11 51.0	32 57	
June 1	12 32.9	28 10	0.39787
2	13 15.9	23 17	
3	13 59.8	18 18	
4	14 44.6	13 12	
5	15 30.4	8 1	0.40601
6	16 17.0	5 2 45	
7	17 4.7	4 57 23	
8	11 17 53.2	+4 51 55	