

ROYAL OBSERVATORY, GREENWICH.

SPECTROSCOPIC OBSERVATIONS

MADE AT THE

ROYAL OBSERVATORY, GREENWICH,

1881.

GREENWICH OBSERVATIONS, 1881.

5 A

OBSERVATIONS OF BRIGHT LINES IN THE SPECTRUM OF SOLAR PROMINENCES AND OF THE CHROMOSPHERE,

OBSERVATIONS of BRIGHT LINES in the SPECTRUM of SOLAR PROMINENCES and of the CHROMOSPHERE, made at the ROYAL OBSERVATORY, GREENWICH, in the Year 1881.

Note.—The position-angles for solar prominences, or for the part of the chromosphere examined, are reckoned from the north pole of the Sun's axis in the direction N., E., S., W., N. In the case of prominences, the position-angles for the two extremities of the prominence are given.

The height in seconds of arc, the estimated brightness, and the estimated breadth of the several bright lines seen, are given for each prominence and for selected points of the chromosphere. The average brightness of each line is estimated in terms of the brightness of the corresponding part of the solar spectrum. The lines are usually fainter at the extremity than at the base. In the case of the *b* lines, the letter *f* denotes that the dark lines are faint in the spectrum of the prominence or chromosphere, but are not seen actually reversed. The average breadth of each line is estimated in terms of the breadth of the corresponding dark line in the solar spectrum, except in the case of the bright line *D₃*, the breadth of which is estimated in terms of the dark line *C*. The bright lines are usually narrower at the extremity than at the base.

On several occasions the *F* line has been seen "doubly reversed" in the neighbourhood of the limb, *i.e.*, a fine dark line is seen in the middle of the bright *F* line, which is itself in the middle of the dark *F* line much broadened.

The "Half-prism" Spectroscope with a train of two "half-prisms" was used throughout. For viewing the prominences and chromosphere the spectroscope is reversed end for end, the slit and eye-piece being interchanged, so that the pencil is incident on the oblique face and emerges at the perpendicular face of each "half-prism." Thus the breadth of the spectrum-lines, considered as monochromatic images of the slit, is diminished, and greater purity of spectrum is obtained. In order to view a prominence in its just proportions, the breadth is afterwards magnified by means of a small "half-prism" (direct-vision) placed between the eye-piece and the eye.

Observer, M.

Greenwich Mean Solar Time, 1881.	Position Angle from Sun's Axis.	Height in Seconds of arc on the C Line.	REMARKS.
d h m May 6. 1. 0 to 1. 45	° ' 52. 52 } 54. 32 } 62. 42 } 73. 52 } 123. 2 } 126. 42 } 110. 42 } 112. 2 } 143. 32 } 144. 32 } 291. 52 } 295. 2 } 296. 22 } 297. 52 }	" 37 47 43 27 35 37 24	Faint straight jet. Long bank with three or four jets rising from it. Bright jet partly detached. Straight jet; bright. Faint straight jet. Partly detached. Straight jet. The chromosphere averaged 8" to 10" in height. The entire limb of the Sun was examined once with the slit radial on the C line only.
May 6. 23. 35 23. 36 23. 40 23. 45	52. 52 } 56. 52 } 60. 12 } 75. 32 } 126. 12 } 128. 32 } 209. 22 } 212. 32 }	42 47 24 50	} The two prominences formed a fine continuous group, showing much detail. A straight jet. Forked jet. The entire limb of the Sun was examined once with the slit radial on the C line only.
May 9. 1. 25 1. 26 0. 50 1. 30 1. 30 1. 32 1. 35	29. 30 } 31. 0 } 43. 30 } 44. 40 } 64. 50 } 66. 4 } 61. 0 } 67. 40 } 69. 0 } 74. 40 } 75. 10 } 76. 40 } 204. 40 } 213. 20 }	24 22 20 24 20 30 35	Straight jet. Straight jet. Straight jet. Forked jet. The same prominence as the preceding. In the interval of 40^m between the observations it had undergone considerable change. No detail. Straight jet. Prominence with several jets. The entire limb of the Sun was examined once with the slit radial on the C line only.
May 20. 0. 40 0. 40	54. 50 } 56. 10 } 58. 50 } 62. 50 }	20 25	Small jet. Forked jet.

1883 JANUARY

Greenwich Mean Solar Time, 1881.	Position Angle from Sun's Axis.	Height in Seconds of arc on the C Line.	REMARKS.
d h m	° ' "	"	
May 20. 0. 43	138. 0 } 138. 50 }	18	Straight jet.
0. 45	150. 40 } 153. 0 }	45	Bright straight jet.
0. 48	154. 20 } 155. 10 }	20	Faint straight jet.
0. 55	213. 10 } 214. 50 }	17	Small straight jet.
1. 0	215. 50 } 219. 40 }	28	Low bank.
1. 2	234. 10 } 249. 50 }	90	Very fine prominence; very much broken. The entire limb of the Sun was examined once with the slit radial on the C line only.
May 21. 0. 0	55. 21 } 58. 11 }	22	Straight jet.
0. 6	149. 31 } 151. 11 }	33	Detached cloud.
0. 5	212. 31 } 216. 31 }	45	Straight jet.
0. 3	288. 31 } 291. 11 }	34	Straight jet.
0. 2	303. 21 } 304. 31 }	18	Straight jet. Sun in white haze, and the C line in the chromosphere very faint. None but very brilliant prominences could therefore be seen. The entire limb of the Sun was examined once with the slit radial on the C line only.
May 22. 22. 15	149. 11 } 153. 21 }	50	No detail.
22. 0	283. 51 } 286. 51 }	20	Small jet.
22. 5	314. 11 } 315. 51 }	28	Faint straight jet.
22. 5	327. 51 } 330. 21 }	50	No details perceived. Chromosphere and prominences very faint indeed. Seen in much mist. Search not satisfactory. The entire limb of the Sun was examined once with the slit radial on the C line only.

Greenwich Mean Solar Time, 1881.	Position Angle from Sun's Axis.	Height in Seconds of arc.				Brightness.				Breadth.				REMARKS.
		C	D ₃	¹⁴⁷⁴ K	F	C	D ₃	¹⁴⁷⁴ K	F	C	D ₃	¹⁴⁷⁴ K	F	
d h m	° ' "	"	"	"	"									
May 23. 22. 0	6. 16	12	12	?	?	$\frac{2}{3}$	$\frac{1}{2}$	?	?	1	$\frac{1}{2}$	?	?	Cloud just detached from limb.
	21. 16	10	10	3	6	$\frac{2}{3}$	$\frac{1}{2}$	$\frac{1}{10}$	$\frac{1}{10}$	1	$\frac{1}{2}$	1	1	
	36. 16	8	8	2	6	$\frac{2}{3}$	$\frac{1}{2}$	1	$\frac{1}{4}$	1	$\frac{1}{2}$	$\frac{1}{10}$	$\frac{1}{4}$	
	51. 16	8	8	2	6	1	1	0	$\frac{1}{2}$	1	$\frac{1}{2}$	$\frac{1}{10}$	$\frac{1}{4}$	
	66. 16	8	8	2	6	$\frac{2}{3}$	$\frac{1}{2}$	1	$\frac{1}{4}$	1	$\frac{1}{2}$	$\frac{1}{10}$	$\frac{1}{4}$	
	81. 16	8	8	?	?	$\frac{2}{3}$	$\frac{1}{2}$	?	$\frac{1}{20}$	1	$\frac{1}{2}$	?	?	
22. 10	93. 15 }	45												
	95. 15 }													
	96. 16	8	8	0	0	$\frac{1}{2}$	$\frac{1}{3}$	0	0	$\frac{1}{5}$	$\frac{1}{2}$	0	0	
	111. 16	7	7	?	6	$\frac{1}{2}$	$\frac{1}{3}$	?	$\frac{1}{5}$	$\frac{4}{5}$	$\frac{1}{2}$	?	1	
22. 12	122. 5 }	50												
	130. 15 }													
	126. 16	9	9	?	?	$\frac{1}{2}$	$\frac{1}{3}$	?	$\frac{1}{20}$	1	$\frac{1}{2}$	?	?	{ Detached cloud. The distance between the upper surface of the chromosphere and the lower surface of the cloud was about 7", that between the lower and upper surfaces was about 17"; in all, 33". No trace of the cloud on any line but C, D ₃ , and F.
		33	33	0	30	$\frac{1}{2}$	$\frac{1}{3}$	0	$\frac{1}{20}$	1	$\frac{1}{2}$	0	?	
22. 15	141. 16	6	6	?	?	$\frac{2}{3}$	$\frac{1}{2}$	?	?	$\frac{3}{4}$	$\frac{1}{2}$	?	?	
	151. 5 }	42												
	153. 35 }													
	156. 16	6	6	0	0	$\frac{2}{3}$	$\frac{1}{2}$	0	0	$\frac{3}{4}$	$\frac{1}{2}$	0	0	
	171. 16	6	6	?	6	$\frac{2}{3}$	$\frac{1}{2}$	?	$\frac{1}{10}$	$\frac{3}{4}$	$\frac{1}{2}$	?	1	
	186. 16	7	8	?	6	$\frac{2}{3}$	$\frac{1}{2}$	?	$\frac{1}{10}$	$\frac{3}{4}$	$\frac{1}{2}$	?	1	
	201. 16	7	8	?	6	$\frac{2}{3}$	$\frac{1}{2}$	?	$\frac{1}{10}$	1	$\frac{1}{2}$	?	1	

OBSERVATIONS OF BRIGHT LINES IN THE SPECTRUM OF SOLAR PROMINENCES AND OF THE CHROMOSPHERE,

Greenwich Mean Solar Time, 1881.	Position Angle from Sun's Axis.	Height in Seconds of arc.				Brightness.				Breadth.				REMARKS.
		C	D ₃	¹⁴⁷⁴ K	F	C	D ₃	¹⁴⁷⁴ K	F	C	D ₃	¹⁴⁷⁴ K	F	
May 23. 22. 20	210. 35 } 213. 15 }	35												Forked prominence.
23. 50	213. 55 } 218. 55 }	7	13	0	0	$\frac{3}{4}$	$\frac{2}{3}$	0	0	1	$\frac{1}{2}$	0	0	A small faint prominence seen only on D ₃ . Definition most variable, but C never seen higher than 7".
	231. 16 } 246. 16 }	7	8	0	0	$\frac{2}{3}$	$\frac{2}{3}$	0	0	1	$\frac{1}{2}$	0	0	Definition very bad.
	261. 16 } 276. 16 }	6	6	0	0	$\frac{1}{2}$	$\frac{1}{2}$	0	0	$\frac{3}{4}$	$\frac{1}{2}$	0	0	
22. 25	287. 35 } 290. 15 }	20												Bright straight jet.
	291. 16 }	8	9	0	0	$\frac{3}{4}$	$\frac{2}{3}$	0	0	$\frac{3}{4}$	$\frac{1}{2}$	0	0	
22. 27	299. 45 } 300. 45 }	18												Small jet.
	306. 16 }	7	7	0	0	$\frac{3}{4}$	$\frac{2}{3}$	0	0	$\frac{3}{4}$	$\frac{1}{2}$	0	0	
22. 30	314. 5 } 315. 55 }	45												Bright straight jet.
	321. 16 }	9	9	?	7	$\frac{1}{2}$	$\frac{1}{2}$	?	$\frac{1}{20}$	$\frac{3}{4}$	$\frac{1}{2}$	?	1	
22. 32	327. 55 } 329. 55 }	48												Bright straight jet.
	336. 16 }	8	10	?	7	$\frac{1}{2}$	$\frac{1}{2}$	?	$\frac{1}{20}$	$\frac{3}{4}$	$\frac{1}{2}$	?	1	Definition very bad; limb boiling. The D ₃ line seemed less affected than C or F.
	351. 16 }	11	11	?	?	$\frac{1}{2}$	$\frac{1}{2}$	?	?	1	$\frac{1}{2}$	?	?	D ₁ , D ₂ , the E and the b lines were nowhere seen reversed. Definition in general, poor; limb boiling; haze round Sun. The entire limb of the Sun was examined twice with the slit radial.
Greenwich Mean Solar Time, 1881.	Position Angle from Sun's Axis.	Height in Seconds of arc on the C line.		REMARKS.										
June 1. 1. 26	50. 35 } 52. 35 }	22												Small straight jet.
1. 25	75. 35 } 76. 55 }	43												Bright straight jet.
1. 24	118. 35 } 121. 15 }	14												Long low bank.
1. 21	143. 35 } 145. 55 }	60												Very faint detached cloud.
1. 20	147. 15 } 147. 55 }	22												Small faint jet.
1. 18	221. 55 } 225. 5 }	19												No detail.
1. 16	233. 5 } 236. 35 }	36												Faint, but some detail seen.
1. 15	241. 15 } 244. 15 }	19												Forked prominence.
1. 30	289. 55 } 291. 55 }	65												Faint detached cloud.
1. 28	299. 5 } 301. 5 }	19												Small faint straight jet.
1. 12	314. 15 } 317. 15 }	24												Faint.
														Sun in white haze. Limb badly defined. The entire limb of the Sun was examined once with the slit radial on the C line only.
June 3. 22. 50	61. 24 } 66. 43 }	60												Broken; partly detached.
22. 50	69. 20 } 71. 37 }	18												Straight jet.
22. 42	144. 53 } 149. 43 }	70												Broken; partly detached.

Greenwich Mean Solar Time, 1881.			Position Angle from Sun's Axis.	Height in Seconds of arc on the C line.	REMARKS.
d	h	m	°	'	"
June 3.	22.	35	230. 23	35	Straight jet.
			231. 20		
	22.	55	277. 38	20	Partly detached. The entire limb of the Sun was examined once with the slit radial on the C line.
			279. 59		
June 22.	0.	40	43. 10	79	Fine prominence; much broken.
			48. 40		
	0.	43	103. 10	58	Very brilliant prominence.
			111. 10		
	0.	45	120. 50	36	Bending over a great deal to the North.
			127. 10		
	0.	46	153. 0	29	Straight jet.
			155. 0		
	1.	28	206. 24	77	Fine double jet; much detail.
			211. 7		
	1.	35	215. 40	43	Nearly detached.
			215. 58		
	1.	40	227. 35	41	Much detail.
			231. 57		
	2.	5	249. 0	31	Straight jet.
			250. 10		
	2.	0	312. 20	36	Straight jet. Observations continually interrupted by passing cloud. The entire limb of the Sun was examined once with the slit radial on the C line only.
			315. 40		
June 30.	22.	32	23. 40	36	Irregular jet, expanding at the top.
			26. 0		
	22.	35	52. 20	31	Irregular jet.
			55. 0		
	22.	36	55. 40	48	Fine bright prominence.
			67. 0		
	22.	40	145. 40	101	Fine prominence.
			149. 40		
	22.	42	151. 20	34	Straight jet.
			153. 50		
	22.	45	203. 0	19	Straight jet.
			204. 20		
	22.	48	228. 10	67	Detached. Lower surface 26" from limb.
			231. 20		
	22.	50	231. 30	53	Nearly detached.
			233. 40		
	22.	50	239. 50	29	Partly detached.
			241. 0		
	22.	52	242. 0	46	Partly detached.
			245. 50		
	22.	55	251. 50	58	Completely detached. Lower surface 29" from limb.
			252. 20		
	22.	57	297. 40	19	Very faint straight jet.
			298. 0		
	23.	0	313. 20	17	Straight jet.
			314. 20		
	22.	25	319. 0	19	Straight jet.
			320. 30		
22.	30	336. 40	24	Straight jet. The entire limb of the Sun was examined once with the slit radial on the C line only.	
		337. 20			

OBSERVATIONS OF BRIGHT LINES IN THE SPECTRUM OF SOLAR PROMINENCES AND OF THE CHROMOSPHERE,

Greenwich Mean Solar Time, 1881.			Position Angle from Sun's Axis.	Height in Seconds of arc.			Brightness.			Breadth.			REMARKS.
				C	D ₃	F	C	D ₃	F	C	D ₃	F	
d h m	° ' "	"	"	"	"	"	"	"	"	"	"	"	
July 4. 1. 33	22. 28	22	22	10	$\frac{1}{2}$	$\frac{1}{5}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{4}$	1			Faint jet.
	23. 38												
1. 35	46. 28	38	38	29	$\frac{2}{3}$	$\frac{1}{3}$	$\frac{1}{10}$	$\frac{2}{3}$	$\frac{1}{3}$	$\frac{2}{3}$			
	49. 8												
1. 35	59. 8	22	22	17	$\frac{2}{3}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{1}{2}$	$\frac{2}{3}$			Long low bank.
	64. 38												
0. 58	78. 18	19	22	17	$\frac{2}{3}$	$\frac{1}{2}$	$\frac{1}{4}$	1	$\frac{1}{2}$	$\frac{2}{3}$			Cloud-shaped; slightly irregular in outline.
	81. 38												
1. 0	93. 8	19	17	14	$\frac{2}{3}$	$\frac{1}{2}$	$\frac{1}{4}$	1	$\frac{1}{2}$	$\frac{2}{3}$			Small faint jet.
	94. 18												
1. 2	94. 38	17	17	12	$\frac{2}{3}$	$\frac{1}{2}$	$\frac{1}{4}$	1	$\frac{1}{2}$	$\frac{2}{3}$			Straight jet.
	97. 8												
1. 3	114. 58	19											Straight jet.
	117. 8												
1. 5	130. 28	24											Straight jet.
	132. 8												
1. 8	201. 48	79	79	48	$\frac{1}{2}$	$\frac{1}{5}$	$\frac{1}{10}$	$\frac{2}{3}$	$\frac{1}{3}$	$\frac{2}{3}$			Very fine; much broken.
	209. 8												
1. 15	236. 8	48	50	43	1	$\frac{2}{3}$	$\frac{1}{2}$	1	$\frac{1}{2}$	1			Bright straight jet.
	236. 58												
1. 20	210. 18	48	48	41	$\frac{1}{2}$	$\frac{1}{5}$	$\frac{1}{10}$	$\frac{2}{3}$	$\frac{1}{3}$	$\frac{2}{3}$			Straight jet.
	212. 28												
1. 28	296. 8	24	24	17	$\frac{2}{3}$	$\frac{1}{3}$	$\frac{1}{10}$	$\frac{2}{3}$	$\frac{1}{3}$	$\frac{2}{3}$			Straight jet.
	298. 8												
1. 30	305. 28	17	17	12	$\frac{2}{3}$	$\frac{1}{3}$	$\frac{1}{10}$	$\frac{2}{3}$	$\frac{1}{3}$	$\frac{2}{3}$			Straight jet.
	307. 8												
1. 31	330. 8	22	22	10	$\frac{1}{2}$	$\frac{1}{5}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{4}$	1			Faint jet.
	331. 28												The entire limb of the Sun was examined once with the slit radial.

Greenwich Mean Solar Time, 1881.			Position Angle from Sun's Axis.	Height in Seconds of arc on the C line.	REMARKS.
d h m	° ' "	"			
July 5. 0. 56	13. 48	26			Nearly detached.
	14. 38				
1. 0	26. 8	43			Broken; bright.
	27. 28				
0. 40	59. 8	29			Straight jet.
	65. 8				
0. 41	75. 38	17			Straight jet.
	76. 48				
0. 42	131. 48	34			Straight jet.
	133. 28				
0. 44	136. 28	19			Straight jet.
	138. 8				
0. 45	204. 18	43			Straight jet; very faint.
	205. 28				
0. 46	206. 58	60			Nearly detached.
	208. 28				
0. 48	211. 48	48			Faint; detached.
	213. 28				
0. 50	234. 18	41			Very bright straight jet.
	237. 8				
0. 52	248. 8	17			Bright straight jet.
	252. 48				
0. 53	320. 48	14			Straight jet.
	321. 48				
0. 55	328. 48	14			Small very faint straight jet.
	330. 38				The entire limb of the Sun was examined with the slit radial on the C line only.

Greenwich Mean Solar Time, 1881.	Position Angle from Sun's Axis.	Height in Seconds of arc on the C line.	REMARKS.
Aug. 21. 23. 10	27. 54 } 31. 14 }	26	Partly detached.
23. 55	32. 4 } 33. 54 }	31	Straight jet. Not seen in the first search.
22. 0. 18	64. 4 } 65. 14 }	19	Straight jet. Not seen in the first search.
21. 23. 40	69. 34 } 71. 54 }	29	Small bright prominence.
23. 43	108. 14 } 108. 54 }	24	Straight jet.
23. 45	130. 44 } 132. 34 }	29	Straight jet.
23. 50	146. 14 } 147. 4 }	19	Straight jet.
23. 51	148. 4 } 148. 54 }	22	Straight jet.
22. 0. 25	202. 34 } 203. 44 }	19	Small straight jet. Not seen in the first search.
21. 22. 35	225. 34 } 242. 14 }	50	Fine bright prominence; much detail.
22. 37	274. 44 } 275. 54 }	50	Completely detached. Lower surface 19" from the limb.
22. 38	278. 54 } 280. 14 }	41	Faint detached cloud.
23. 0	284. 34 } 292. 14 }	72	Much detail.
23. 6	303. 24 } 306. 54 }	48	Very faint.
23. 4	308. 14 } 311. 24 }	41	Very faint.
23. 8	335. 14 } 339. 14 }	26	Prominence with much detail.
			The entire limb of the Sun was examined twice with the slit radial on the C line only. Work much interrupted by cloud rendering observation difficult.
Aug. 27. 1. 0	5. 53 } 7. 3 }	14	Straight jet. Not seen in the first search.
1. 0	36. 43 } 39. 13 }	38	Straight jet. Not seen in the first search.
0. 27	77. 43 } 78. 3 }	24	Straight jet; very bright.
0. 27	95. 3 } 97. 3 }	31	Straight jet.
0. 35	112. 33 } 114. 13 }	50	Fine bright prominence.
0. 36	124. 53 } 125. 13 }	19	Partly detached.
0. 38	151. 33 } 155. 43 }	53	Straight jet.
26. 22. 30	212. 53 } 215. 33 }	29	At 0 ^h . 40 ^m it extended as far as 207° 43', was 55" in height, and was very much broken.
22. 32	228. 53 } 233. 43 }	46	Fine prominence; much detail.
22. 34	240. 23 } 247. 3 }	89	Very fine prominence; much detail.
22. 35	255. 33 } 258. 23 }	26	Straight jet. At 0 ^h . 20 ^m this prominence had united with the next. Both were now much broken, and extended much further towards the Sun's North Pole than before.
22. 37	260. 53 } 264. 43 }	48	
27. 0. 23	279. 53 } 281. 3 }	17	Straight jet.
0. 25	290. 53 } 293. 23 }	14	Low bank.
0. 55	317. 33 }	22	Center of a very narrow faint detached cloud. Under surface about 14" from limb; upper about 22". Not seen in first search.

OBSERVATIONS OF BRIGHT LINES IN THE SPECTRUM OF SOLAR PROMINENCES AND OF THE CHROMOSPHERE,

Greenwich Mean Solar Time, 1881.	Position Angle from Sun's Axis.	Height in Seconds of arc on the C line.	REMARKS.
d h m	° ' "	"	
Aug. 27. o. 26	332. 13 } 334. 43 }	41	Broken prominence.
o. 26	335. 33 } 337. 13 }	34	Broken prominence.
			The entire limb of the Sun was examined twice with the slit radial on the C line only.
Oct. 1. o. 44	17. 59 } 20. 39 }	24	
o. 45	29. 39 } 30. 29 }	34	Partly detached.
o. 20	84. 19 } 86. 9 }	26	Faint prominence with ill-defined outline.
o. 21	87. 19 } 89. 39 }	17	Small faint jet.
o. 22	136. 49 } 138. 39 }	19	Straight jet.
o. 23	154. 19 } 156. 39 }	29	Straight jet.
o. 26	227. 19 } 228. 39 }	19	
o. 27	252. 9 } 256. 19 }	26	Straight jet.
o. 30	306. 9 } 306. 59 }	24	
o. 42	312. 19 } 315. 29 }	36	Partly detached.
			The entire limb of the Sun was examined once with the slit radial on the C line only. Sun in white haze.
Oct. 3. o. 3	6. 53 } 10. 53 }	29	Partly detached.
o. 5	22. 43 } 31. 48 }	67	Fine prominence; much broken.
o. 7	51. 53 } 53. 13 }	24	Small straight jet.
o. 8	57. 18 } 58. 48 }	22	Small straight jet.
o. 13	65. 33 } 67. 38 }	19	Small straight jet.
o. 15	78. 33 } 80. 33 }	17	Small straight jet.
o. 16	88. 58 } 89. 53 }	26	Faint.
o. 18	112. 53 } 115. 33 }	14	Partly detached.
o. 19	117. 33 } 119. 8 }	17	
o. 19	119. 43 } 120. 43 }	17	
o. 19	122. 53 } 123. 33 }	14	
o. 20	152. 43 } 154. 53 }	24	Straight jet.
o. 22	155. 58 } 156. 53 }	24	Straight jet.
o. 57	270. 33 } 281. 43 }	91	Very fine prominence; much detail.
o. 59	296. 53 } 301. 8 }	38	
o. 1	332. 3 } 333. 23 }	22	Straight jet.
			The entire limb of the Sun was examined once with the slit radial on the C line. C and D ₃ showed the same changes throughout. The sky was not clear enough to see F, b, 1474 K, or the two D lines. Sun in white haze. Limb boiling.

Greenwich Mean Solar Time, 1881.	Position Angle from Sun's Axis.	Height in Seconds of arc.		REMARKS.
		C	D ₃	
Oct. 16. 23. 20	16. 18	"	"	
	17. 48	17	17	
23. 21	26. 58	26	26	Long irregular shaped bank.
	37. 48			
23. 23	63. 18	14	14	
	64. 28			
23. 25	67. 38	17	17	
	70. 48			
23. 26	71. 28	38	38	Long bank with a thin jet in the center.
	81. 38			
23. 53	95. 38	19	19	Very narrow.
	96. 18			
23. 28	103. 38	24	24	Forked prominence.
	108. 18			
23. 30	112. 28	24	24	Bright narrow jet.
	113. 8			
23. 31	114. 28	89	89	Bright prominence, much broken.
	120. 18			
23. 34	152. 28	17	17	
	152. 58			
23. 37	196. 38	55	55	Fine prominence, much detail.
	203. 58			
23. 40	236. 38	36	36	Partly detached.
	238. 58			
23. 41	240. 38	31	31	Bending over towards the North.
	242. 18			
23. 44	291. 38	53	53	Fine bright prominence with regular outline.
	301. 8			
23. 45	304. 8	53	53	Fine bright prominence with regular outline.
	308. 38			
23. 47	322. 18	26	26	Forked prominence, faint.
	323. 38			The entire limb of the Sun was examined twice with the slit radial on the C and D ₃ lines.

Greenwich Mean Solar Time, 1881.	Position Angle from Sun's Axis.	Height in Seconds of arc on the C line.	REMARKS.
Oct. 17. 21. 50	19. 51	19	
	21. 31		
21. 50	28. 31	29	
	32. 31		
21. 51	34. 21	31	Partly detached.
	37. 21		
21. 55	38. 21	34	Bending over to the South.
	40. 36		
22. 2	94. 21	36	Partly detached.
	98. 11		
22. 5	99. 51	31	Straight jet.
	102. 51		
22. 8	104. 11	24	Straight jet.
	104. 51		
22. 10	108. 41	26	Straight jet.
	112. 1		
22. 12	112. 51	26	Straight jet.
	115. 1		
22. 12	115. 41	22	Straight jet.
	116. 41		
22. 15	120. 1	72	Much broken.
	123. 51		
22. 17	134. 21	24	Straight jet.
	135. 11		
22. 18	146. 1	38	Faint.
	147. 21		

OBSERVATIONS OF BRIGHT LINES IN THE SPECTRUM OF SOLAR PROMINENCES AND OF THE CHROMOSPHERE,

Greenwich Mean Solar Time, 1881.	Position Angle from Sun's Axis.	Height in Seconds of arc on the C line.	REMARKS.
d h m	° ' "	"	
Oct. 17. 22. 20	162. 21 } 163. 41 }	14	Straight jet.
22. 21	181. 41 } 182. 31 }	14	Straight jet.
21. 40	198. 19 } 205. 1 }	74	Fine bright prominence.
21. 43	226. 11 } 228. 6 }	24	Bending over towards the North.
21. 45	288. 51 } 290. 21 }	96	A perfectly detached cloud. Lower surface 58" from the limb; highest point above surface 96".
21. 47	306. 41 } 311. 41 }	53	Fine bright prominence.
21. 49	324. 31 } 328. 11 }	31	Marked displacement towards the blue of the upper southern tip of this prominence. The entire limb of the Sun was examined once with the slit radial on the C line only.
Dec. 19. 23. 21	18. 11 } 20. 21 }	29	Faint.
23. 22	22. 11 } 25. 31 }	43	Bright.
23. 24	60. 21 } 65. 21 }	41	Partly detached.
23. 34	81. 11 } 82. 31 }	22	Faint jet. Not seen in the first search.
23. 25	129. 31 } 130. 51 }	22	Straight jet. Not seen in the second search.
23. 26	135. 11 } 138. 31 }	34	
23. 28	201. 21 } 203. 31 }	48	Bright straight jet.
23. 16	266. 11 } 268. 21 }	38	Straight jet; faint.
23. 18	283. 31 } 286. 11 }	41	Bright. Chromosphere averaged 7" to 10" in height. Prominences and chromosphere faint. Sun in white haze. The entire limb of the Sun was examined twice with the slit radial on the C line only.
Dec. 20. 23. 3	17. 39 } 20. 34 }	48	Faint.
23. 6	24. 9 } 26. 19 }	24	Faint.
23. 8	60. 59 } 62. 49 }	22	Faint straight jet.
23. 10	67. 19 } 68. 29 }	41	Faint straight jet.
23. 12	70. 39 } 72. 19 }	55	Partly detached.
22. 43	213. 26 } 217. 21 }	43	
22. 46	289. 4 } 291. 19 }	46	Bright prominence; considerable detail.
23. 0	312. 24 } 314. 15 }	29	Feathery tufted prominence; forked jet. The chromosphere averaged 7" to 10" in height. Prominences and chromosphere faint. Sun in too much haze for examination on other lines. The entire limb of the Sun was examined once with the slit radial on the C line only.

OBSERVATION of a SOLAR STORM at POSITION ANGLE (from SUN'S AXIS) 70° on 1881 August 22.

At $23^h.40^m$ a small but brilliant prominence was seen extending from $69^\circ 34'$ to $71^\circ 54'$, and attaining a height of $29''$. At $23^h.57^m$ two prominences were observed at this point, the first from $68^\circ 14'$ to $69^\circ 14'$, height $24''$; the second, evidently that observed at $23^h.40^m$ from $69^\circ 34'$ to $71^\circ 4'$, height $58''$. Of these two prominences the smaller vanished whilst the dimensions of the other were being taken, *i.e.*, in about a minute and a half from the time when it was measured as $24''$ in height it had entirely disappeared. The C line had been noticed to be about twice or three times its usual breadth on this prominence before it disappeared. The C line on the larger prominence was now very brilliant, and of irregular shape, being twisted and knotted. At $0^h.16^m$ only a small faint fragment of the prominence, some $17''$ or $19''$ in height, was visible. A minute or two later its height was only $13''$. At $0^h.32^m$ this prominence had risen again to $19''$ but was somewhat narrower, extending from $69^\circ 34'$ to $70^\circ 34'$; at $0^h.52^m$ it was $43''$ in height, bending over to the North.

Between these times the following observations were made of the principal lines:—

- C Very much contorted; upper N. point displaced $\frac{3}{8}$ tenth-metre towards the blue, corresponding to a motion of approach of 19 miles per second. Half-way up it was double its ordinary breadth.
- D₁ Height $4''$.
- D₂ Suspected. Not so distinct as D₁.
- D₃ Height the same as on C.
- 1474 K Height $6''$.
- b₁, b₂ Very faint. Height $5''$.
- b₄ Only suspected.
- F The bright F was visible on the Sun on either side of the dark F line, but especially on the red side, for quite $12''$ from the limb. The displacement at the upper N. point was about $\frac{3}{4}$ tenth-metre towards the blue, corresponding to a motion of approach of 29 miles per second. Height the same as on C.

OBSERVATIONS OF SPECTRA of SUN SPOTS made at the ROYAL OBSERVATORY, GREENWICH, in the Year 1881.

The diagrams, Plates I., II., and III., show the lines which were observed to be broadened in the spectra of the Sun-spots examined. The length of each line represents the amount by which it is broadened—full length corresponding to a line of which the breadth is increased by one-half. In the case of lines the breadth of which is increased by more than one-half, or to which there is no corresponding line in the solar spectrum, the breadth of the line in the diagram is intended to represent the actual breadth of the line as seen in the spot-spectrum. For convenience of reference a copy of Ångström's map of the solar spectrum from D to F, together with the corresponding lines of terrestrial elements, is given above and below the spectra of Sun-spots.

The numeration of the spots is taken from the Photographic Results.

The observations were made by Mr. Maunder with the Half-prism Spectroscope mounted on the South-East Equatoreal. One half-prism giving a dispersion of about $18\frac{1}{2}^\circ$ from A to H, or two half-prisms giving a dispersion of about 80° were used.

NOTES.

- January 6. The lines of the spot spectrum were not much affected as a rule. C was slightly broadened, say by one-seventh. Pos. angle of slit 90° . Definition poor. Two-prism train. Magnifying power of eye-piece 10.
- January 7. More lines were broadened than on January 6, and the amount of broadening was somewhat greater. C was broadened by about one-third. Two-prism train. Magnifying power 10.
- March 11. Most of the lines between F and b seemed to be broadened, some considerably so, but from the poor definition it was not found possible to mark all down on the chart, the fainter lines being identified with difficulty. D₁ and D₂ were much broadened, and displaced towards the blue by about $\frac{1}{4}$ tenth-metre, equivalent to a motion of approach of 8 miles per second. Pos. angle of slit 89° . Two-prism train. Magnifying power 10.
- March 14. Spectrum examined from F to c (wave-length 4957 tenth-metres). The D lines were doubled in breadth. Definition poor. Day very hazy. Pos. angle of slit 27° . One-prism train. Magnifying power 28.
- March 15. Spectrum examined from F to c. The D lines were doubled in breadth. Definition bad. Pos. angle of slit 27° . Both the one-prism and the two-prism trains were tried.
- March 18. A slight displacement towards the blue was suspected in most of the lines affected, in all of those between c and 5005, but the definition was so bad that it could not be established with certainty except in a few cases. A displacement of $\frac{1}{20}$ tenth-metre, equivalent to a motion of approach of 2 miles a second, seemed to be shown by the following lines:—4864, 4865, 4877, and c. The b lines and the D lines, the latter of which were doubled in breadth, also showed a slight displacement in the same direction. The following lines seemed to be slightly twisted:—4918, 4920, c, and the close pair at 5005, the part of the line over the northern half of the spot being displaced towards the blue, that over the southern towards the red. The amount of the displacement was exceedingly small, and it was most apparent over the nucleus. Lines 4867 and 5112 were doubled in breadth. Bands similar in character to those observed on 1880 November 27 and December 11 were suspected at 5053, 5058, 5092, 5095, 5015, 5017, 5020, but it was difficult to make out whether these were really dark bands, or whether the intermediate spaces at 5055, 5093, 5116, and 5118 were occupied by bright lines. The line at 5162 seemed displaced 0.2 tenth-metre towards the red, equivalent to a motion of recession of 7 miles a second, but this appearance may have been caused by the proximity of one of the shaded bands. Pos. angle of slit 5° . Definition poor. One-prism train. Magnifying power 28.
- March 19. The "bands" of 1880, November 27, were much more conspicuous than on March 18, but were still difficult objects. The following bands were represented on the general disk by fine lines, not in Ångström's chart:—5043, 5055, and 5061. Five other of the bands seemed to occupy the following relationship to lines of the normal spectrum, viz., that one edge of the line as seen on the Sun was in the same straight line as one edge of the band as seen over the spot. It was thus not possible to decide whether these lines were greatly widened and at the same time much displaced, or whether they were merely overlapped by perfectly independent bands. The latter view seems the more probable. In this case bands 5058 and 5095 were on the blue side of the lines they overlapped, and bands 5115,

Plate I.
LINES BROADENED IN THE SPECTRA OF SUN-SPOTS OBSERVED AT THE ROYAL OBSERVATORY, GREENWICH
IN THE YEAR 1881.

Wave-Length 5895 (D) - 5540.

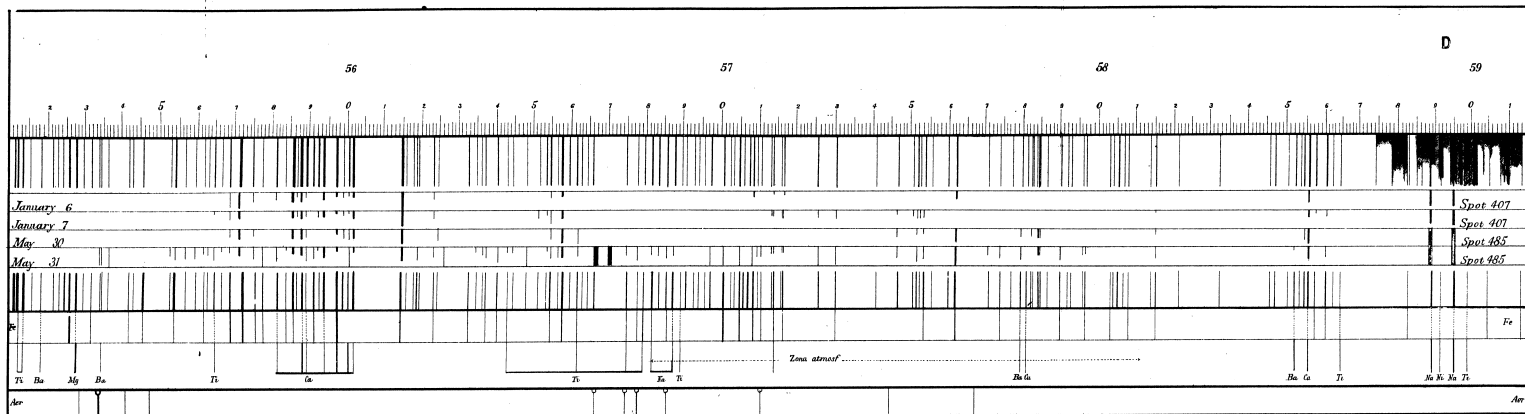


Plate II.
LINES BROADENED IN THE SPECTRA OF SUN SPOTS OBSERVED AT THE ROYAL OBSERVATORY, GREENWICH
IN THE YEAR 1881.

Wave-Length 5540 - 5183 (b)

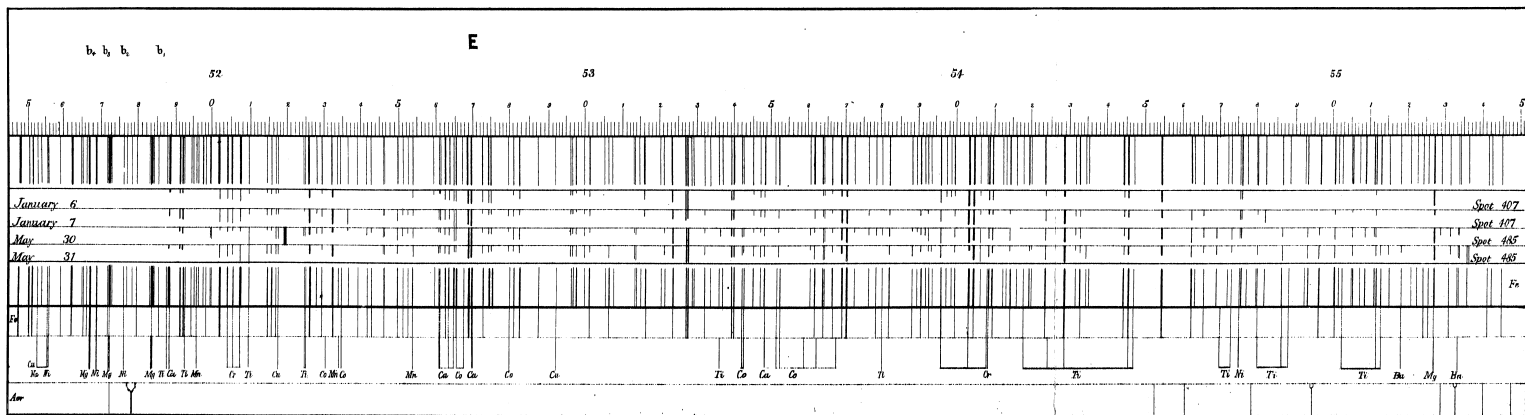
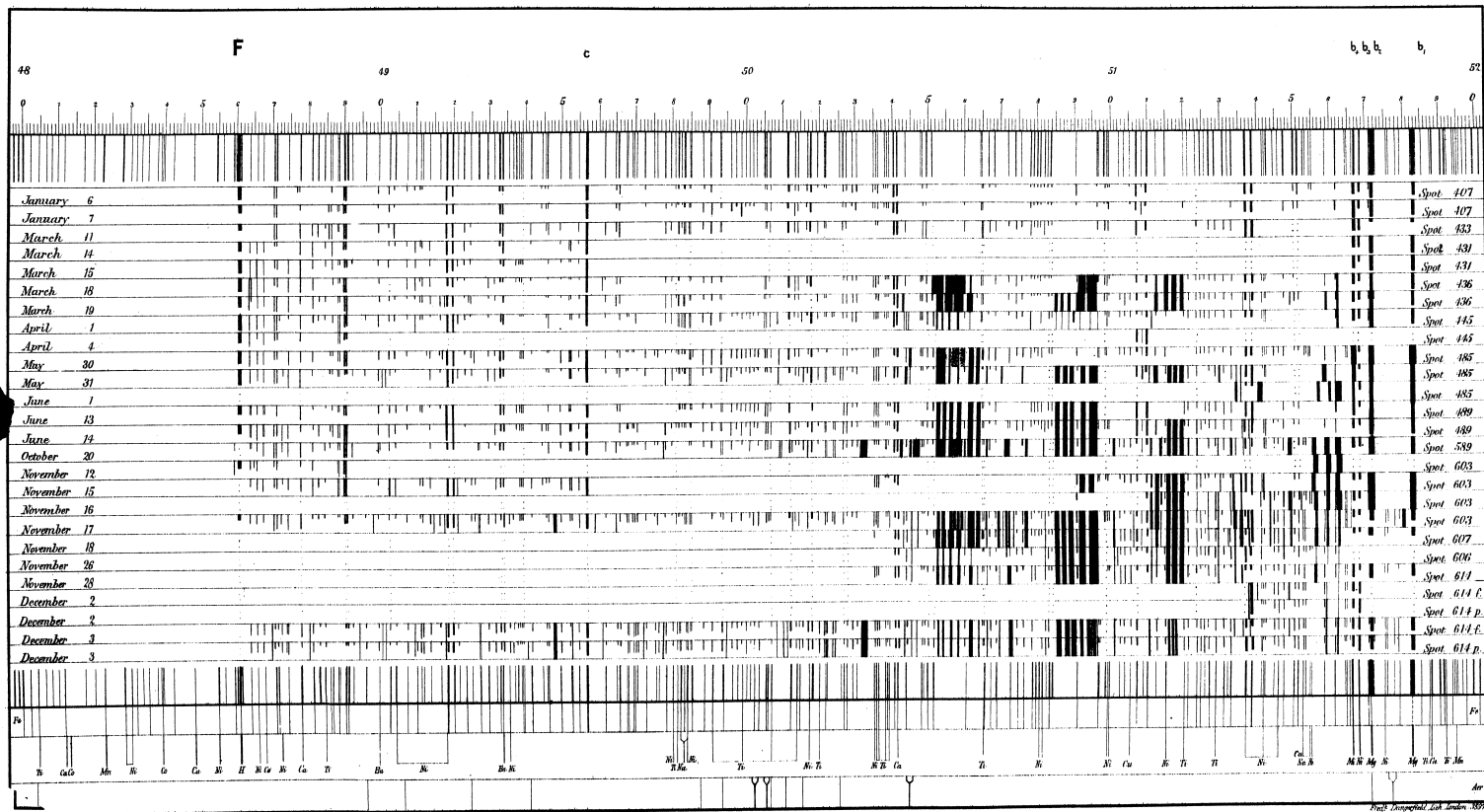


Plate III
 LINES BROADENED IN THE SPECTRA OF SUN-SPOTS OBSERVED AT THE ROYAL OBSERVATORY, GREENWICH.
 IN THE YEAR 1881.

Wave-Length. 5153 (b) - 4860 (F)



- 5159, and 5162 on the red. The bands were all darkest over the nucleus. The F line was reversed 1' S. of the spot, a fine bright line 20" in length being seen on the centre of the dark F line at $0^h.40^m$. It was only seen for a moment and could not afterwards be detected. The D lines were rather more than doubled in breadth. Pos. angle of slit 5° . One-prism train. Magnifying power 28.
- April 1. The following lines were twisted, being displaced by about $\frac{1}{6}$ tenth-metre towards the red, equivalent to a motion of recession of about 6 miles per second, over the following portion of the spot only:—4985, 4993, the close pair at 5005, 5007, 5018, 5051, 5096, 5162, and the four *b* lines. It was suspected that two, 4870 and 5099, were displaced towards the blue over the same place, but this was not ascertained with certainty. The observation being hurried, it is possible that several other lines may have been twisted without the fact being remarked. The D lines were half as broad again as usual. C was only slightly broadened, say by one-tenth. Pos. angle of slit 275° . Definition bad. One-prism train. Magnifying power 28.
- April 4. Definition very bad. It was only possible to observe from F to 4890.
- May 30. The lines which were increased in breadth were faint at the edges. It was therefore very difficult to detect displacement with certainty. Lines 4988 and 4990 were, however, clearly seen to be displaced towards the blue by about 0.07 tenth-metre, equivalent to a motion of approach of about 3 miles per second. It was also suspected that the *b* lines were displaced. The C line was doubled in breadth. The portion of the spectrum from 5000 to 5040 showed many lines not in Ångström, and much time was lost over their identification. Pos. angle of slit 244° , taking in both nuclei at once. One-prism train. Magnifying power 28.
- May 31. C line half as broad again as usual. Both C and F faint and ill-defined at the edges. D lines very nebulous over the spot, displacement towards the blue suspected. Nearly every visible line was broadened, and many new lines were seen over the spot. The changes were of much more than average amount, and are but partially represented on the chart. Lines 5096 and 5120 were both represented over the spot by bands, the red edge of each of which was in a line with the red edge of the corresponding line, so that the line seemed greatly broadened and much displaced towards the blue. Another band corresponded to the iron line 5159. Pos. angle of slit 244° . One-prism train. Magnifying power 28.
- June 1. The spectrum from F to *b* was examined, but only for displacement of the lines, no records of broadening being made on the chart except for a few lines near *b*. No displacement was clearly made out anywhere, unless the coincidence of the edge of a line on the Sun with the edge of a band over the spot, as noticed yesterday in the case of lines 5096, 5120, be cases in point. The entire series of the "bands" was clearly seen. Pos. angle of slit 244° . One-prism train. Magnifying power 28.
- June 11. Spot 489. The majority of the lines between F and *b* were very strongly affected. The "bands" were visible but were faint. The *b* lines were doubled in breadth, the F line was half as broad again as usual. No further observations made. One-prism train. Magnifying power 28.
- June 13. The D lines were about one-third as broad again as usual, the C line was unchanged. F and the *b* lines were very ill-defined over the spot, the edges being faint and indistinct. The "bands" were all present, and the spectral lines generally were much affected. The spectrum of the nucleus was very dark. The lines seemed generally contorted a little, the part over the northern part of the spot being slightly displaced towards the red, that over the southern towards the blue, but the definition was too bad for this to be established with certainty. Three lines, however, 4878, 4918, 4920, were *wholly* displaced towards the blue by about 0.1 tenth-metre, equivalent to a motion of approach of about 4 miles per second. Line 4923 showed no change that could be certainly established. The examination generally was not satisfactory, nor is the chart very trustworthy, owing to the bad definition. One-prism train. Magnifying power 28.
- June 14. No very marked change since yesterday could be detected in the spectrum. The C line was slightly broadened. The D lines were about one-third as broad again as on the Sun. They were also displaced by one-third of a tenth-metre towards the blue, equivalent to a motion of approach of about 12 miles a second, over the southern portion of the spot. It was suspected that many other lines were displaced in the same direction, but to a much smaller extent. The "bands" were seen as usual, and could be traced occasionally on the Sun. They were so faint and difficult there, however, as to give the impression rather of *bright lines* in the intervening spaces than of absorption bands in the localities corresponding to the bands of the spot spectrum. A similar appearance has been noticed on former

- occasions in the spot-spectrum itself when the bands have been faint. A remarkable appearance, noted for the first time on this day, was the appearance in many places, but especially in the group 5120 to 5150, of new lines, each distant one-third or one-half a tenth-metre towards the blue from a line of the normal spectrum, which it exactly resembled in appearance; thus giving rise to the idea that these lines were *doubled* and *displaced*. The only instances recorded on the chart are those of the lines 5137 and 5139. The Sun was often lost in cloud, and the definition was very variable. One-prism train. Magnifying power 28.
- August 4. Spot 538. No record was made upon the chart. The C and F lines were slightly broadened. The D lines were broadened by $\frac{3}{4}$, b_1 , b_2 , by $\frac{2}{3}$, b_3 , b_4 , by $\frac{1}{2}$. Lines 4918 and 4920 were broadened by about $\frac{1}{4}$, but no displacement was noted. b_5 was displaced towards the blue about $\frac{1}{8}$ tenth-metre, equivalent to a motion of approach of 6 miles per second. No alteration of any kind was detected in 4923. Lines 5139 and 5137 were seen to be much broadened, but only towards the blue. On previous occasions this appearance seemed to be due to new lines close to those ordinarily seen. On this occasion there seemed nothing to give rise to this suspicion. Breadth of 5139, 0.7 or 0.8 tenth-metre, of 5137, 0.5. Pos. angle of slit 90°. Definition poor. One prism train. Magnifying power 28.
- October 19. Spot 589. No record was made upon the chart. Observations interrupted by cloud. The "bands" were very distinct, but there was no opportunity of examining them in detail. One-prism train. Magnifying power 28.
- October 20. The D lines $2\frac{1}{2}$ times usual breadth, the E lines $1\frac{1}{2}$. C, F, and 1474 K were not affected. One-prism train. Magnifying power 28.
- November 12. The "bands" were present and were very dark. They were present also, but very much more faintly over the general disk in the neighbourhood of the spot. A few lines only had been examined when the sky clouded over. Definition fair so long as the Sun was out. Two-prism train. Magnifying power 14.
- November 15. Several lines in the group 5120 to 5133 were displaced towards the blue over the northern part of the spot by about one-third tenth-metre, equivalent to a motion of approach of about 12 miles per second, but were seen for too short a time for them to be identified. The "bands" were fairly distinct. The spectrum from 4960 to 5080 was not examined. Pos. angle of slit 6°. Definition usually bad. One-prism train. Magnifying power 28.
- November 16. The spot-spectrum was very strongly marked, the "bands" being distinct, and a very unusual number of "new" lines being seen. A great many of the lines of the normal spectrum seemed quite unchanged, but those which were altered were very strongly affected indeed. The spectrum had only been examined from b to 5110 when the Sun clouded over. The images were exceedingly unsteady, and clouds were passing the whole time of observation. Pos. angle of slit 6°. One-prism train. Magnifying power 28.
- November 17. The general character of the spectrum was unchanged since yesterday. No displacements could be made out with certainty. Line 5115 was wanting over the spot; line 4923 was much fainter than on the general disk. The neighbourhood of G was examined to ascertain if the bright spaces at 4317 and 4319 suffered change over the spot, but no change was detected. The images were exceedingly unsteady, and clouds were passing the whole time of observation. Pos. angle of slit 6°. One-prism train. Magnifying power 28.
- November 18. The close pair at 5155 was wanting; line 5115 was fainter over the spot. F was broadened by one-sixth, C by one-quarter, the D lines by two-thirds. Sun in fog, air steady. Spectrum examined only from b to 5035. Pos. angle of slit 6°. One-prism train. Magnifying power 28. With two-prism train the "bands" were more easily traced upon the Sun, and seemed to be composed of fine lines, but this could not be ascertained with certainty. Each band seen over the spot seemed represented by a faint band over the general disk in the neighbourhood of the spot.
- November 26. The spot showed much less general and less selective absorption than on November 18. The b lines were not affected. C and F were a little broader than on November 18, being each broadened by about one-third. The D lines were broadened by one-quarter. Over the whole spot fewer lines were affected, and these to a much less degree; fewer new lines were seen, and these were fainter than on the former occasion. The "bands," all of which were visible, were a little fainter. Spectrum examined from b to 5035. Pos. angle of slit 6°. One-prism train. Magnifying power 28.

- November 28. The spectrum of the spot was not much darker than that of the general disk. The lines affected were not hard, black, and well defined, as in the great spot No. 603 of November 12-21, but their edges were ill-defined and shaded off gradually. It was, therefore, very difficult to say by how much a line was broadened. The lines affected were but very little darker than on the disk, the "bands" on the contrary were remarkably dark and distinct, but somewhat narrower than is usual over a spot. The F line suffered no change, C was suspected to be very slightly broader. The D lines were broader by one-third, the E lines by two-thirds. The spectrum was examined only from b to 5035. Pos. angle of slit 40° . Definition very bad. One-prism train. Magnifying power 28.
- December 2. The sky was never clear for long together, and after repeated attempts the spectrum could only be examined from b to 5135. The only remarkable change noticed was that whilst b_1 and b_2 were unaffected, and b_4 broadened only to a slight degree, b_3 was about one-third as broad again as usual over each of the halves of the spot. The two halves showed some trivial differences, of which one or two are recorded on the chart. The changes over the following half of the spot are recorded on the upper of the two lines for this day, those over the preceding half on the lower line. Pos. angle of slit 96° . One-prism train. Magnifying power 28.
- December 3. The preceding half of the spot showed on the whole a little less change as regards the broadening of the lines than the following, but two or three more "new" lines were seen in it. The appearance of numerous new lines was the principal characteristic of both spectra. No displacements were noticed. The "bands" were visible, but were not dark. Some of them indeed were seen as fine lines, and others appeared to be resolvable. The D lines were broadened by one-quarter. C and F were somewhat nebulous over the spots, but did not seem to be otherwise affected. The changes over the following half of the spot are recorded on the upper of the two lines for this day, those over the preceding half on the lower line. Pos. angle of slit 96° . One-prism train. Magnifying power 28.

MEASURES OF DISPLACEMENT OF LINES in the SPECTRA of STARS, as compared with those of
ROYAL OBSERVATORY, GREENWICH,

Note.—The motion corresponding to the displacement actually observed may be inferred from the Concluded Motion by adding the Earth's Motion algebraically.

The "Half-prism" Spectroscope was used throughout. The numerals in the third column denote the number of "Half-prisms" used. Each "Half-prism" is compound, and is composed of a flint "half-prism," (*i.e.*, the half of an isosceles prism, cut by a plane perpendicular to the base,) and a crown prism, cemented on the emergent face, so as to form the half of a direct-vision prism. With one such half-prism, a dispersion of about $18\frac{1}{2}^\circ$ from A to H, equivalent to that produced by four flint prisms of 60° , is obtained; and with a train of two a dispersion of about 80° , equivalent to that produced by sixteen flint prisms of 60° . The dispersions have been inferred from measurements of the distance between b_1 and b_4 as compared with the wave-length measure.

Date, 1881, Greenwich Sidereal Time.	Observer.	Number of Half- Prisms.	Reading of Position Circle.	Objects compared.	Micrometer Readings.	Displacement.		Width of Slit.
						Measured.	Estimated in Terms of the Breadth of the Comparison Line.	
d h m Feb. 16. 8. 15	M	1	270	Sirius F.....	0.337	r		r
8. 45	"	"	"	H β	0.272	+ 0.065	$\frac{1}{3}$ towards red	0.178
	"	"	"	Sirius F.....	0.334			
	"	"	"	H β	0.289	+ 0.045	$\frac{1}{3}$ towards red	0.178
Feb. 16. 9. 10	M	1	270	Procyon F	0.382			
9. 25	"	"	"	H β	0.221	+ 0.161	$\frac{4}{5}$ towards red	0.178
	"	"	"	Procyon F	0.313			
	"	"	"	H β	0.219	+ 0.094	$\frac{1}{2}$ towards red	0.178
Feb. 28. 6. 40	M	1	95	Rigel F.....	0.756			
7. 0	"	"	"	H β	0.664	+ 0.092	$\frac{3}{5}$ towards red	0.110
	"	"	"	Rigel F.....	0.749			
	"	"	"	H β	0.648	+ 0.101	$\frac{3}{5}$ towards red	0.110
Feb. 28. 7. 35	M	1	95	Sirius F.....	0.865			
7. 55	"	"	"	H β	0.814	+ 0.051	$\frac{2}{5}$ towards red	0.110
	"	"	"	Sirius F.....	0.903			
	"	"	"	H β	0.816	+ 0.087	$\frac{3}{5}$ towards red	0.110
Feb. 28. 8. 25	M	1	95	γ Geminorum F.....	0.865			
8. 45	"	"	"	H β	0.776	+ 0.089	$\frac{3}{5}$ towards red	0.110
	"	"	"	γ Geminorum F.....	0.812			
	"	"	"	H β	0.783	+ 0.029	$\frac{1}{5}$ towards red	0.110
Feb. 28. 9. 10	M	1	95	Procyon F	0.328			
9. 25	"	"	"	H β	0.276	+ 0.052	$\frac{1}{4}$ towards red	0.110
	"	"	"	Procyon F	0.325			
	"	"	"	H β	0.277	+ 0.048	$\frac{1}{4}$ towards red	0.110
Feb. 28. 21. 0	M	1	95	Sky F	0.154			
	"	"	"	H β	0.092	+ 0.062		0.110
	"	"	"	Sky F	0.174			
	"	"	"	H β	0.161	+ 0.013		0.110
	"	"	"	Sky F	0.191			
	"	"	"	H β	0.093	+ 0.098		0.110
	"	"	"	Sky F	0.166			
	"	"	"	H β	0.166	0.000		0.110
	"	"	"	Sky F	0.161			
	"	"	"	H β	0.153	+ 0.008		0.110
Mar. 14. 7. 55	M	1	95	Rigel F.....	0.728			
8. 15	"	"	"	H β	0.881	+ 0.153	$\frac{4}{5}$ towards red	0.208
	"	"	"	Rigel F.....	0.717			
	"	"	"	H β	0.873	+ 0.156	$\frac{4}{5}$ towards red	0.208

The day specified in the first column is the Solar Day in ordinary astronomical reckoning; the hours and minutes are those of Greenwich Sidereal Time.

TERRESTRIAL ELEMENTS, and CONCLUDED MOTIONS in the LINE of SIGHT, from OBSERVATIONS at the in the Year 1881.

1 rev. of the micrometer corresponds, with one "half-prism" to 10.8 tenth-metres or 391 miles per second for the *b* lines, and to 8.03 tenth-metres or 308 miles per second for the F line; and with two "half-prisms" to 2.1 tenth-metres or 76 miles per second for *b* and to 1.68 tenth-metres or 64 miles per second for F.

1 rev. of the screw for opening the slit corresponds to 0.01 inch, or about 10".

The slit lies north and south when the reading of the Position-Circle is 6°.

The weights are on a scale 1 to 5 for each observation.

The estimations of the displacements have been made by *indirect* comparison with the comparison-line, except where the contrary is expressly stated.

Earth's Motion in Miles per Second.	Concluded Motion of Star in Miles per Second.		Weight.	REMARKS.
	Measured.	Estimated.		
+ 10.4	+ 9.6	+ 11.8	1	Spectrum very tremulous, and definition very bad.
+ 10.4	+ 3.5	+ 11.8	1	
+ 10.2	+ 39.5	+ 43.1	2	Star-line faint. Spectrum tremulous, and definition bad.
+ 10.2	+ 18.8	+ 23.1	2	
+ 16.0	+ 12.4	+ 19.9	1	Definition very bad.
+ 16.0	+ 15.1	+ 19.9	1	
+ 12.2	+ 3.5	+ 11.8	2	Definition bad.
+ 12.2	+ 14.6	+ 23.7	2	
+ 16.5	+ 11.0	+ 19.4	1	Definition bad. Measures uncertain.
+ 16.5	— 7.6	— 4.5	1	
+ 13.0	+ 3.1	+ 2.0	4	Definition fair.
+ 13.0	+ 1.8	+ 2.0	4	
0.0	+ 19.1			
0.0	+ 4.0			
0.0	+ 30.2			
0.0	0.0			
0.0	+ 2.5			
+ 15.7	+ 31.5	+ 21.8	3	Spectrum tremulous. Definition poor.
+ 15.7	+ 32.4	+ 21.8	3	

The velocity of light has been taken as 186 660 miles per second, and the distance of the Sun as 92 250 000 miles.
The sign + denotes recession; — approach.

Date, 1881, Greenwich Sidereal Time.	Observer.	Number of Half- Prisms.	Reading of Position Circle.	Objects compared.	Micrometer Readings.	Displacement.		Width of Slit.
						Measured.	Estimated in Terms of the Breadth of the Comparison Line.	
d h m Mar. 14. 9. 35	M	1	95	γ Geminorum F'	0.469			r
10. 0	"	"	"	H β	0.555	+ 0.086	$\frac{1}{2}$ towards red	0.208
	"	"	"	γ Geminorum F'	0.396			
	"	"	"	H β	0.551	+ 0.155	$\frac{2}{3}$ towards red	0.208
Mar. 14. 10. 15	M	1	95	Procyon F'	0.498			
10. 35	"	"	"	H β	0.591	+ 0.093	$\frac{1}{2}$ towards red	0.208
	"	"	"	Procyon F'	0.618			
	"	"	"	H β	0.769	+ 0.151	$\frac{2}{3}$ towards red	0.208
Mar. 14. 10. 50	M	1	95	Moon F'	0.556			
	"	"	"	H β	0.574	+ 0.018		0.208
	"	"	"	Moon F'	0.591			
	"	"	"	H β	0.547	- 0.044		0.208
	"	"	"	Moon F'	0.559			
	"	"	"	H β	0.569	+ 0.010		0.208
	"	"	"	Moon F'	0.567			
	"	"	"	H β	0.571	+ 0.004		0.208
	"	"	"	Moon F'	0.577			
	"	"	"	H β	0.569	- 0.008		0.208
	"	"	"	Moon F'	0.565			
	"	"	"	H β	0.561	- 0.004		0.208
	"	"	"	Moon F'	0.564			
	"	"	"	H β	0.574	+ 0.010		0.208
Mar. 25. 9. 45	M	1	275	Pollux b_1	0.951			
10. 0	"	"	"	Mg ₁	0.812	- 0.139	$\frac{1}{2}$ towards blue	0.232
10. 10	"	"	"	Pollux b_1	0.773			
10. 15	"	"	"	Mg ₁	0.772	- 0.001	Coincident	0.232
	"	"	"	Pollux b_1	0.318			
	"	"	"	Mg ₁	0.164	- 0.154	$\frac{1}{2}$ towards blue	0.232
	"	"	"	Pollux b_1	0.768			
	"	"	"	Mg ₁	0.772	+ 0.004	Coincident	0.232
Mar. 25. 10. 35	M	1	275	γ Leonis b_1	0.462			
10. 55	"	"	"	Mg ₁	0.571	+ 0.109	$\frac{2}{3}$ towards red	0.232
	"	"	"	γ Leonis b_1	0.554			
	"	"	"	Mg ₁	0.613	+ 0.059	$\frac{1}{3}$ towards red	0.232
Mar. 25. 11. 35	M	1	275	ϵ Leonis b_1	0.437			
11. 50	"	"	"	Mg ₁	0.518	+ 0.081	$\frac{1}{4}$ towards red	0.232
	"	"	"	ϵ Leonis b_1	0.506			
	"	"	"	Mg ₁	0.530	+ 0.024	$\frac{1}{10}$ towards red	0.232
Mar. 25. 12. 25	M	1	275	β Virginis b_1	0.686			
12. 45	"	"	"	Mg ₁	0.567	- 0.119	$\frac{1}{2}$ towards blue	0.232
	"	"	"	β Virginis b_1	0.632			
	"	"	"	Mg ₁	0.549	- 0.083	$\frac{1}{3}$ towards blue	0.232
Mar. 26. 1. 0	M	1	275	Sky b_1	0.593			
	"	"	"	Mg ₁	0.602	+ 0.009		0.232
	"	"	"	Sky b_1	0.608			
	"	"	"	Mg ₁	0.609	+ 0.001		0.232
	"	"	"	Sky b_1	0.636			
	"	"	"	Mg ₁	0.638	+ 0.002		0.232
	"	"	"	Sky b_1	0.626			
	"	"	"	Mg ₁	0.648	+ 0.022		0.232
	"	"	"	Sky b_1	0.698			
	"	"	"	Mg ₁	0.688	- 0.010		0.232
	"	"	"	Sky b_1	0.708			
	"	"	"	Mg ₁	0.689	- 0.019		0.232

The day specified in the first column is the Solar Day in ordinary astronomical reckoning; the hours and minutes are those of Greenwich Sidereal Time.

Earth's Motion in Miles per Second.	Concluded Motion of Star in Miles per Second.		Weight.	REMARKS.
	Measured.	Estimated.		
+ 18.0	+ 8.5	+ 14.8	2	
+ 18.0	+ 29.8	+ 25.8	1	
+ 15.6	+ 13.1	+ 17.2	3	
+ 15.6	+ 31.0	+ 28.2	2	
0.0	+ 5.6			The coincidence of the lines in the two spectra seemed to be perfect.
0.0	- 13.6			
0.0	+ 3.1			
0.0	+ 1.2			
0.0	- 2.5			
0.0	- 1.2			
0.0	+ 3.1			
+ 17.5	- 71.7	- 82.4	2	Spectrum very bright and fairly steady, but star-lines faint, ill-defined, and difficult to see.
+ 17.5	- 17.9	- 17.5	2	
+ 17.5	- 77.5	- 82.4	1	
+ 17.5	- 15.9	- 17.5	1	
+ 11.1	+ 31.4	+ 40.8	1	Star-lines exceedingly difficult to see.
+ 11.1	+ 11.9	+ 14.9	1	
+ 13.2	+ 18.4	+ 19.3	2	Definition somewhat improved. Star-lines darker than in Pollux and γ Leonis.
+ 13.2	- 3.9	- 0.2	2	
+ 3.3	- 49.7	- 68.2	1	Spectrum faint. Measurement very difficult.
+ 3.3	- 35.6	- 46.6	1	
0.0	+ 3.5			
0.0	+ 0.4			
0.0	+ 0.8			
0.0	+ 8.6			
0.0	- 3.9			
0.0	- 7.4			

The velocity of light has been taken as 186 660 miles per second, and the distance of the Sun as 92 250 000 miles.
The sign + denotes recession; - approach.

Date, 1881, Greenwich Sidereal Time.	Observer.	Number of Half- Prisms.	Reading of Position Circle.	Objects compared.	Micrometer Readings.	Displacement.		Width of Slit.
						Measured.	Estimated in Terms of the Breadth of the Comparison Line.	
d h m Mar. 28. 9. 20	M	1	° 275	Aldebaran b_1	r 1'003	r		r
9. 35	,,	,,	,,	Mg ₁	0'761	+ 0'242	1 towards red	0'205
	,,	,,	,,	Aldebaran b_1	0'972			
	,,	,,	,,	Mg ₁	0'747	+ 0'225	1 towards red	0'205
Mar. 28. 10. 10	M	1	275	Pollux b_1	0'913			
10. 25	,,	,,	,,	Mg ₁	0'868	+ 0'045	$\frac{1}{4}$ towards red	0'205
	,,	,,	,,	Pollux b_1	0'962			
	,,	,,	,,	Mg ₁	0'871	+ 0'091	$\frac{1}{3}$ towards red	0'205
Mar. 29. 0. 0	M	1	275	Sky b_1	0'836			
	,,	,,	,,	Mg ₁	0'852	- 0'016		0'205
	,,	,,	,,	Sky b_1	0'848			
	,,	,,	,,	Mg ₁	0'828	+ 0'020		0'205
	,,	,,	,,	Sky b_1	0'861			
	,,	,,	,,	Mg ₁	0'840	+ 0'021		0'205
	,,	,,	,,	Sky b_1	0'832			
	,,	,,	,,	Mg ₁	0'859	- 0'027		0'205
	,,	,,	,,	Sky b_1	0'849			
	,,	,,	,,	Mg ₁	0'839	+ 0'010		0'205
	,,	,,	,,	Sky b_1	0'831			
	,,	,,	,,	Mg ₁	0'835	- 0'004		0'205
Mar. 31. 8. 15	M	1	275	Aldebaran b_1	0'792			
8. 30	,,	,,	,,	Mg ₁	1'074	+ 0'282	1 towards red	0'180
8. 40	,,	,,	,,	Aldebaran b_1	0'905			
	,,	,,	,,	Mg ₁	1'146	+ 0'241	1 towards red	0'180
	,,	,,	,,	Aldebaran b_1	0'798			
	,,	,,	,,	Mg ₁	1'056	+ 0'258	1 towards red	0'180
Mar. 31. 9. 5	M	1	275	α Orionis b_4	0'674			
9. 20	,,	,,	,,	Mg ₃	0'752	+ 0'078	$\frac{1}{2}$ towards red	0'180
	,,	,,	,,	α Orionis b_4	0'646			
	,,	,,	,,	Mg ₃	0'751	+ 0'105	$\frac{1}{2}$ towards red	0'180
Mar. 31. 9. 45	M	1	275	α Orionis b_1	0'126			
10. 5	,,	,,	,,	Mg ₁	0'165	+ 0'039	$\frac{1}{4}$ towards red	0'180
	,,	,,	,,	α Orionis b_1	0'033			
	,,	,,	,,	Mg ₁	0'169	+ 0'136	$\frac{3}{8}$ towards red	0'180
Mar. 31. 10. 25	M	1	275	Capella b_1	0'780			
10. 40	,,	,,	,,	Mg ₁	0'875	+ 0'095	$\frac{1}{2}$ towards red	0'180
	,,	,,	,,	Capella b_1	0'752			
	,,	,,	,,	Mg ₁	0'835	+ 0'083	$\frac{1}{2}$ towards red	0'180
Mar. 31. 11. 25	M	1	275	α Hydræ b_1	0'321			
11. 45	,,	,,	,,	Mg ₁	0'329	+ 0'008	$\frac{1}{10}$ towards blue	0'180
	,,	,,	,,	α Hydræ b_1	0'332			
	,,	,,	,,	Mg ₁	0'322	- 0'010	$\frac{1}{10}$ towards red	0'180
Mar. 31. 12. 15	M	1	275	ϵ Virginis b_1	0'398			
12. 40	,,	,,	,,	Mg ₁	0'380	- 0'018	$\frac{1}{10}$ towards blue	0'180
	,,	,,	,,	ϵ Virginis b_1	0'342			
	,,	,,	,,	Mg ₁	0'378	+ 0'036	$\frac{1}{4}$ towards red	0'180

The day specified in the first column is the Solar Day in ordinary astronomical reckoning; the hours and minutes are those of Greenwich Sidereal Time.

Earth's Motion in Miles per Second.	Concluded Motion of Star in Miles per Second.		Weight.	REMARKS.
	Measured.	Estimated.		
+ 15.8 + 15.8	+ 78.6 + 71.9	+ 102.7 + 102.7	2 2	Spectrum very tremulous, and definition poor. Star-lines dark, but difficult to isolate satisfactorily.
+ 17.7 + 17.7	- 0.2 + 17.8	+ 11.9 + 21.8	3 3	Spectrum steady, and definition good at moment of measurement. Observations much interrupted by passing cloud.
0.0 0.0 0.0 0.0 0.0 0.0	- 6.2 + 7.8 + 8.2 - 10.5 + 3.9 - 1.6			
+ 15.3 + 15.3 + 15.3	+ 94.7 + 78.7 + 85.3	+ 62.3 + 62.3 + 62.3	5 5 5	Spectrum bright, but tremulous. Star-lines dark, and easily seen.
+ 17.1 + 17.1	+ 13.3 + 23.8	+ 22.5 + 22.5	2 2	The b_4 line in the star-spectrum was not satisfactorily isolated.
+ 17.1 + 17.1	- 1.9 + 35.9	+ 2.3 + 29.5	2 4	Spectrum tremulous, but very bright, and definition of star-lines fair.
+ 15.8 + 15.8	+ 21.2 + 16.5	+ 23.0 + 23.0	4 4	Spectrum tremulous, but very bright. Definition fair.
+ 12.2 + 12.2	- 9.1 - 16.1	- 4.4 - 20.0	2 2	Spectrum tremulous, and rather faint. Star-lines faint, and hard to see.
+ 10.1 + 10.1	- 17.1 + 3.9	- 17.9 + 9.3	1 1	Star-lines very faint, and hard to see.

The velocity of light has been taken as 186 660 miles per second, and the distance of the Sun as 92 250 000 miles.
The sign + denotes recession; - approach.

Date, 1881, Greenwich Sidereal Time.	Observer.	Number of Half- Prisms.	Reading of Position Circle.	Objects compared.	Micrometer Readings.	Displacement.		Width of Slit.
						Measured.	Estimated in Terms of the Breadth of the Comparison Line.	
d h m Apr. 1. 0. 0	M	1	275	Sky b_1	0.428			
	"	"	"	Mg ₁	0.409	— 0.019		0.180
	"	"	"	Sky b_1	0.422			
	"	"	"	Mg ₁	0.382	— 0.040		0.180
	"	"	"	Sky b_1	0.402			
	"	"	"	Mg ₁	0.396	— 0.006		0.180
	"	"	"	Sky b_1	0.392			
	"	"	"	Mg ₁	0.404	+ 0.012		0.180
	"	"	"	Sky b_1	0.348			
	"	"	"	Mg ₁	0.342	— 0.006		0.180
Apr. 6. 10. 0	WC	1	275	Moon b_1	0.975			
	"	"	"	Mg ₁	0.945	— 0.030		0.150
10. 10	"	"	"	Moon b_1	0.949			
	"	"	"	Mg ₁	1.008	+ 0.059		0.150
10. 20	"	"	"	Moon b_1	1.108			
	"	"	"	Mg ₁	1.052	— 0.056		0.150
Apr. 6. 10. 50	WC	1	275	Capella b_1			$\frac{3}{8}$ towards red	0.150
	"	"	"	Mg ₁				
11. 10	"	"	"	Capella b_1			$\frac{3}{8}$ towards red	0.150
	"	"	"	Mg ₁				
Apr. 7. 9. 5	M	2	275	Aldebaran b_1	0.181			
	"	"	"	Mg ₁	0.707	+ 0.526	$\frac{9}{20}$ towards red	0.170
9. 25	"	"	"	Aldebaran b_1	0.286			
	"	"	"	Mg ₁	0.791	+ 0.505	$\frac{4}{9}$ towards red	0.170
Apr. 7. 9. 55	M	2	275	α Orionis b_1	0.529			
	"	"	"	Mg ₁	0.740	+ 0.211	$\frac{1}{4}$ towards red	0.170
10. 5	"	"	"	α Orionis b_1	0.450			
	"	"	"	Mg ₁	0.746	+ 0.296	$\frac{3}{10}$ towards red	0.170
10. 15	"	"	"	α Orionis b_4	0.821			
	"	"	"	Mg ₃	1.434	+ 0.613	$\frac{1}{2}$ towards red	0.170
10. 20	"	"	"	α Orionis b_4	0.064			
	"	"	"	Mg ₃	0.366	+ 0.302	$\frac{1}{4}$ towards red	0.170
Apr. 7. 10. 40	M	2	275	Capella b_1	0.740			
	"	"	"	Mg ₁	1.426	+ 0.686	$\frac{3}{8}$ towards red	0.170
10. 50	"	"	"	Capella b_1	0.804			
	"	"	"	Mg ₁	1.492	+ 0.688	$\frac{3}{8}$ towards red	0.170
11. 0	"	"	"	Capella b_1	0.995			
	"	"	"	Mg ₁	1.549	+ 0.554	$\frac{1}{2}$ towards red	0.170
11. 10	"	"	"	Capella b_4	0.498			
	"	"	"	Mg ₃	1.066	+ 0.568	$\frac{4}{7}$ towards red	0.170
Apr. 7. 11. 30	M	2	275	Pollux b_1	0.451			
	"	"	"	Mg ₁	0.235	— 0.216	$\frac{1}{4}$ towards blue	0.170
11. 45	"	"	"	Pollux b_4	0.578			
	"	"	"	Mg ₃	0.779	+ 0.201	$\frac{1}{4}$ towards red	0.170
11. 55	"	"	"	Pollux b_1	0.280			
	"	"	"	Mg ₁	0.285	+ 0.005	Coincident	0.170
12. 0	"	"	"	Pollux b_1	0.116			
	"	"	"	Mg ₁	0.223	+ 0.107	$\frac{1}{10}$ towards red	0.170
12. 10	"	"	"	Pollux b_1	0.207			
	"	"	"	Mg ₁	0.285	+ 0.078	$\frac{1}{20}$ towards red	0.170

The day specified in the first column is the Solar Day in ordinary astronomical reckoning; the hours and minutes are those of Greenwich Sidereal Time.

1883GOAMM. 43F...1A

Earth's Motion in Miles per Second.	Concluded Motion of Star in Miles per Second.		Weight.	REMARKS.
	Measured.	Estimated.		
0.0	- 7.4			
0.0	- 15.6			
0.0	- 2.3			
0.0	+ 4.7			
0.0	- 2.3			
0.0	- 11.7		5	The coincidence of the lines in the two spectra appeared to be perfect.
0.0	+ 23.0		5	
0.0	- 21.8		3	
+ 15.0		+ 51.0	3	Definition variable. Lines seen by glimpses.
+ 15.0		+ 58.3	3	
+ 13.9	+ 26.0	+ 24.6	3	Spectrum very faint and tremulous. Star-lines not well defined.
+ 13.9	+ 24.4	+ 24.0	3	
+ 16.4	- 0.4	+ 5.0	4	Spectrum faint, but not so faint as that of Aldebaran. Spectrum fairly steady, and definition fair.
+ 16.4	+ 6.1	+ 9.3	4	
+ 16.4	+ 30.1	+ 24.4	4	
+ 16.4	+ 6.5	+ 10.8	4	
+ 14.9	+ 37.1	+ 36.4	5	Spectrum bright. This star would bear even higher dispersion. Definition fair.
+ 14.9	+ 37.3	+ 36.4	5	
+ 14.9	+ 27.1	+ 27.9	5	
+ 14.9	+ 28.2	+ 31.7	5	
+ 18.1	- 34.5	- 39.5	2	Spectrum faint and tremulous. Star-lines faint, and definition poor.
+ 18.1	- 2.9	+ 2.3	2	
+ 18.1	- 17.7	- 18.1	2	
+ 18.1	- 10.0	- 9.5	3	
+ 18.1	- 12.2	- 13.8	3	

The velocity of light has been taken as 186 660 miles per second, and the distance of the Sun as 92 250 000 miles.
The sign + denotes recession ; - approach.

Date, 1881, Greenwich Sidereal Time.	Observer.	Number of Half- Prisms.	Reading of Position Circle.	Objects compared.	Micrometer Readings.	Displacement.		Width of Slit.
						Measured.	Estimated in Terms of the Breadth of the Comparison Line.	
d h m Apr. 7. 12. 25	M	2	275	Moon b_1 Mg ₁ Moon b_2 Mg ₂ Moon b_4 Mg ₃	r 0.338 0.342 0.635 0.618 0.617 0.609	r + 0.004 - 0.017 - 0.008	r 0.170 0.170 0.170	
Apr. 9. 10. 0 10. 20 10. 30	M " "	1 " "	275 " "	β Tauri F H β β Tauri F H β β Tauri F H β	0.905 0.973 0.851 0.989 0.876 0.972	+ 0.068 + 0.138 + 0.096	$\frac{1}{3}$ towards red $\frac{2}{3}$ towards red $\frac{1}{2}$ towards red	0.300 0.300 0.300
Apr. 9. 11. 5 11. 20	M "	1 "	275 "	β Aurigæ F H β β Aurigæ F H β	0.779 0.837 0.842 0.849	+ 0.058 + 0.007	$\frac{1}{4}$ towards red Coincident	0.300 0.300
Apr. 9. 11. 45 11. 55	M "	1 "	275 "	Procyon F H β Procyon F H β	0.643 0.849 0.697 0.850	+ 0.206 + 0.153	$\frac{3}{4}$ towards red $\frac{2}{3}$ towards red	0.300 0.300
Apr. 9. 12. 10 12. 20	M "	2 "	275 "	Procyon F H β Procyon F H β	0.667 1.205 0.703 1.164	+ 0.538 + 0.461	$\frac{4}{9}$ towards red $\frac{1}{3}$ towards red	0.300 0.300
Apr. 9. 12. 30 12. 35	M "	2 "	275 "	Moon F H β Moon F H β	0.605 0.597 0.626 0.619	- 0.008 - 0.007		0.300 0.300
Apr. 9. 12. 40 12. 45 12. 50 12. 55	M " " "	1 " " "	275 " " "	Moon F H β Moon F H β Moon F H β Moon F H β	0.952 0.935 0.923 0.934 0.908 0.915 0.914 0.916	- 0.017 + 0.011 + 0.007 + 0.002		0.300 0.300 0.300 0.300
Apr. 16. 11. 15 11. 35	M "	1 "	5 "	Castor F H β Castor F H β	0.667 0.769 0.919 0.790	- 0.102 + 0.129	$\frac{2}{3}$ towards blue $\frac{1}{2}$ towards red	0.142 0.142
Apr. 17. 0. 30	M " " " " "	1 " " " " "	5 " " " " "	Sky F H β Sky F H β Sky F H β Sky F H β Sky F H β	0.380 0.375 0.408 0.402 0.439 0.448 0.386 0.352 0.372 0.381	- 0.005 - 0.006 + 0.009 - 0.034 + 0.009		0.142 0.142 0.142 0.142 0.142

The day specified in the first column is the Solar Day in ordinary astronomical reckoning; the hours and minutes are those of Greenwich Sidereal Time.

Earth's Motion in Miles per Second.	Concluded Motion of Star in Miles per Second.		Weight.	REMARKS.
	Measured.	Estimated.		
0.0	+ 0.3			The coincidence of the lines in the two spectra appeared perfect.
0.0	- 1.3			
0.0	- 0.6			
+15.9	+ 5.1	+ 17.4	5	Spectrum steady. Definition good.
+15.9	+ 26.6	+ 44.0	5	
+15.9	+ 13.7	+ 34.1	5	
+15.8	+ 2.1	+ 9.2	4	Definition good, but the star-line not quite so well seen as in β Tauri.
+15.8	- 13.7	- 15.8	4	
+17.6	+ 45.9	+ 57.4	5	Definition good.
+17.6	+ 29.6	+ 49.0	5	
+17.6	+ 17.1	+ 6.8	4	Spectrum faint. Star-line too broad with this dispersion for satisfactory measurement.
+17.6	+ 12.1	+ 0.7	3	
0.0	- 0.5			The coincidence of the lines in the two spectra appeared perfect.
0.0	- 0.5			
0.0	- 5.3			The coincidence of the lines in the two spectra appeared perfect.
0.0	+ 3.4			
0.0	+ 2.2			
0.0	+ 0.6			
+17.7	- 49.1	- 51.1	0	Star-line very broad, and diffused at the edges. It is therefore exceedingly difficult to bisect.
+17.7	+ 22.1	+ 24.1	0	
0.0	- 1.5			
0.0	- 1.8			
0.0	+ 2.8			
0.0	- 10.5			
0.0	+ 2.8			

The velocity of light has been taken as 186 660 miles per second, and the distance of the Sun as 92 250 000 miles.
The sign + denotes recession ; - approach.

Date, 1881, Greenwich Sidereal Time.	Observer.	Number of Half- Prisms.	Reading of Position Circle.	Objects compared.	Micrometer Readings.	Displacement.		Width of Slit.
						Measured.	Estimated in Terms of the Breadth of the Comparison Line.	
d h m May 4. 12. 0	M	1	5	β Leonis F	0'086	r		r
				H β	0'008	+ 0'078	$\frac{2}{3}$ towards red	0'162
12. 15	,,	,,	,,	β Leonis F	0'945			
				H β	1'014	- 0'069	$\frac{1}{2}$ towards blue	0'162
12. 35	,,	,,	,,	β Leonis F	1'019			
				H β	0'991	+ 0'028	$\frac{1}{3}$ towards red	0'162
May 4. 13. 20	M	1	5	γ Virginis F	1'099			
				H β	0'987	+ 0'112	1 towards red	0'162
May 5. 2. 55	M	1	5	Sky F	0'648			
	,,	,,	,,	H β	0'666	- 0'018		0'162
	,,	,,	,,	Sky F	0'694			
	,,	,,	,,	H β	0'633	+ 0'061		0'162
	,,	,,	,,	Sky F	0'662			
	,,	,,	,,	H β	0'683	- 0'021		0'162
	,,	,,	,,	Sky F	0'698			
	,,	,,	,,	H β	0'713	- 0'015		0'162
	,,	,,	,,	Sky F	0'708			
	,,	,,	,,	H β	0'708	0'000		0'162
May 6. 12. 10	M	1	5	Moon F	0'198			
	,,	,,	,,	H β	0'226	- 0'028		0'202
12. 25	,,	,,	,,	Moon F	0'224			
	,,	,,	,,	H β	0'205	+ 0'019		0'202
12. 35	,,	,,	,,	Moon F	0'326			
	,,	,,	,,	H β	0'341	- 0'015		0'202
May 6. 13. 0	M	1	5	δ Leonis F	0'686			
	,,	,,	,,	H β	0'584	+ 0'102	$\frac{3}{8}$ towards red	0'202
13. 15	,,	,,	,,	δ Leonis F	0'638			
	,,	,,	,,	H β	0'578	+ 0'060	$\frac{2}{8}$ towards red	0'202
May 6. 13. 45	M	1	5	β Libræ F	0'487			
	,,	,,	,,	H β	0'592	- 0'105	$\frac{2}{8}$ towards blue	0'202
14. 0	,,	,,	,,	β Libræ F	0'449			
	,,	,,	,,	H β	0'573	- 0'124	$\frac{2}{8}$ towards blue	0'202
May 6. 14. 35	M	1	5	γ Herculis F	0'461			
	,,	,,	,,	H β	0'558	- 0'097	$\frac{3}{8}$ towards blue	0'202
May 11. 12. 35	M	1	5	Regulus F	0'135			
	,,	,,	,,	H β	0'153	- 0'018	$\frac{1}{10}$ towards blue	0'218
12. 45	,,	,,	,,	Regulus F	0'669			
	,,	,,	,,	H β	0'605	+ 0'064	$\frac{2}{8}$ towards red	0'218
13. 0	,,	,,	,,	Regulus F	0'664			
	,,	,,	,,	H β	0'596	+ 0'068	$\frac{1}{2}$ towards red	0'218
May 11. 13. 20	M	1	5	δ Leonis F	0'887			
	,,	,,	,,	H β	0'768	+ 0'119	$\frac{3}{4}$ towards red	0'218
13. 30	,,	,,	,,	δ Leonis F	0'873			
	,,	,,	,,	H β	0'767	+ 0'106	$\frac{2}{8}$ towards red	0'218
May 11. 13. 50	M	1	5	β Leonis F	0'746			
	,,	,,	,,	H β	0'787	- 0'041	$\frac{1}{4}$ towards blue	0'218
14. 5	,,	,,	,,	β Leonis F	0'705			
	,,	,,	,,	H β	0'784	- 0'079	$\frac{1}{2}$ towards blue	0'218

The day specified in the first column is the Solar Day in ordinary astronomical reckoning; the hours and minutes are those of Greenwich Sidereal Time.

1883GOAMW.43F...1A

Earth's Motion in Miles per Second.	Concluded Motion of Star in Miles per Second.		Weight.	REMARKS.
	Measured.	Estimated.		
+ 13.1	+ 10.9	+ 12.4	3	Star-line very diffused, and difficult to bisect.
+ 13.1	- 34.4	- 32.2	3	
+ 13.1	- 4.5	- 5.5	3	
+ 10.6	+ 23.9	+ 27.6	3	Star-line diffused. Observations interrupted by cloud.
0.0	- 5.6			
0.0	+ 18.8			
0.0	- 6.5			
0.0	- 4.6			
0.0	0.0			
0.0	- 8.6			The coincidence of the lines in the two spectra appeared to be perfect, but both the line in comparison spectrum and that in the spectrum of the Moon were difficult to bisect satisfactorily.
0.0	+ 5.9			
0.0	- 4.6			
+ 16.0	+ 15.4	+ 11.4	1	Star-line very diffused and somewhat faint.
+ 16.0	+ 2.5	+ 2.3	1	
- 0.4	- 32.0	- 30.0	2	Star-line darker and not quite so diffused as that in δ Leonis, but still somewhat difficult to bisect.
- 0.4	- 37.8	- 30.0	2	
- 2.6	- 27.3	- 24.8	1	Observation interrupted by cloud. Bisection scarcely satisfactorily completed.
+ 17.9	- 23.5	- 22.9	1	Definition fair. The first measure with the upper pointer, the last two with the lower as usual.
+ 17.9	+ 1.8	+ 1.8	4	
+ 17.9	+ 3.1	+ 6.8	4	
+ 16.6	+ 20.1	+ 20.4	4	Definition fair.
+ 16.6	+ 16.1	+ 16.3	4	
+ 15.5	- 28.1	- 27.8	1	Definition very poor.
+ 15.5	- 39.8	- 40.2	1	

The velocity of light has been taken as 186 660 miles per second, and the distance of the Sun as 92 250 000 miles.
The sign + denotes recession; - approach.

Date, 1881, Greenwich Sidereal Time.	Observer.	Number of Half- Prisms.	Reading of Position Circle.	Objects compared.	Micrometer Readings.	Displacement.		Width of Slit.
						Measured.	Estimated in Terms of the Breadth of the Comparison Line.	
d h m May 11. 14. 35	M	1	5	α Canum Venat. F ... H β	r 0.875 0.938	r — 0.063	$\frac{1}{3}$ towards blue	r 0.218
14. 40	,,	,,	,,	α Canum Venat. F ... H β	0.869 0.967	— 0.098	$\frac{3}{5}$ towards blue	0.218
May 11. 14. 50	M	1	5	Moon F	0.104	.		0.218
15. 0	,,	,,	,,	H β	0.107	— 0.003		0.218
15. 5	,,	,,	,,	Moon F	0.068	— 0.016		0.218
15. 15	,,	,,	,,	H β	0.084	— 0.016		0.218
15. 20	,,	,,	,,	Moon F	0.112	— 0.026		0.218
	,,	,,	,,	H β	0.086	— 0.026		0.218
	,,	,,	,,	Moon F	0.109	— 0.011		0.218
	,,	,,	,,	H β	0.098	— 0.011		0.218
	,,	,,	,,	Moon F	0.106	— 0.005		0.218
	,,	,,	,,	H β	0.111	— 0.005		0.218
May 13. 12. 35	M	1	5	Spica F	0.782	— 0.040	$\frac{1}{4}$ towards blue	0.180
12. 50	,,	,,	,,	H β	0.822	— 0.049	$\frac{1}{3}$ towards blue	0.180
13. 5	,,	,,	,,	Spica F	0.769	— 0.049	$\frac{1}{3}$ towards blue	0.180
13. 15	,,	,,	,,	H β	0.818	— 0.085	$\frac{1}{2}$ towards blue	0.180
	,,	,,	,,	Spica F	0.736	— 0.085	$\frac{1}{2}$ towards blue	0.180
	,,	,,	,,	H β	0.821	— 0.015	$\frac{1}{10}$ towards blue	0.180
	,,	,,	,,	Spica F	0.808	— 0.015	$\frac{1}{10}$ towards blue	0.180
	,,	,,	,,	H β	0.823	— 0.015	$\frac{1}{10}$ towards blue	0.180
May 13. 13. 35	M	1	5	γ Virginis F	0.151	+	$\frac{2}{3}$ towards red	0.180
14. 0	,,	,,	,,	H β	0.033	+	$\frac{2}{3}$ towards red	0.180
	,,	,,	,,	γ Virginis F	1.005	+	$\frac{1}{4}$ towards red	0.180
	,,	,,	,,	H β	0.969	+	$\frac{1}{4}$ towards red	0.180
May 13. 14. 15	M	1	5	Moon F	0.288	+		0.180
14. 25	,,	,,	,,	H β	0.282	+		0.180
	,,	,,	,,	Moon F	0.273	—		0.180
	,,	,,	,,	H β	0.277	—		0.180
May 13. 14. 55	M	1	5	α Coronæ F	0.975	+	$\frac{1}{3}$ towards red	0.180
15. 10	,,	,,	,,	H β	0.926	+	$\frac{1}{3}$ towards red	0.180
	,,	,,	,,	α Coronæ F	0.988	+	$\frac{1}{3}$ towards red	0.180
	,,	,,	,,	H β	0.924	+	$\frac{1}{3}$ towards red	0.180
May 20. 14. 5	M	1	5	η Ursæ Majoris F ...	0.393	+	$\frac{2}{3}$ towards red	0.180
14. 30	,,	,,	,,	H β	0.311	+	$\frac{2}{3}$ towards red	0.180
	,,	,,	,,	η Ursæ Majoris F ...	0.432	+	$\frac{2}{3}$ towards red	0.180
	,,	,,	,,	H β	0.313	+	$\frac{2}{3}$ towards red	0.180
May 20. 15. 25	M	1	5	ζ Ursæ Majoris F ...	0.743	+	$\frac{2}{3}$ towards red	0.180
15. 45	,,	,,	,,	H β	0.632	+	$\frac{2}{3}$ towards red	0.180
	,,	,,	,,	ζ Ursæ Majoris F ...	0.691	+	$\frac{1}{2}$ towards red	0.180
	,,	,,	,,	H β	0.618	+	$\frac{1}{2}$ towards red	0.180
May 20. 16. 10	M	1	5	δ Ursæ Majoris F ...	0.856	—	$\frac{1}{10}$ towards blue	0.180
16. 25	,,	,,	,,	H β	0.868	—	$\frac{1}{10}$ towards blue	0.180
	,,	,,	,,	δ Ursæ Majoris F ...	0.852	—	$\frac{1}{10}$ towards blue	0.180
	,,	,,	,,	H β	0.882	—	$\frac{1}{10}$ towards blue	0.180
May 20. 16. 45	M	1	5	χ Ursæ Majoris F ...	0.696	+	$\frac{1}{2}$ towards red	0.180
17. 0	,,	,,	,,	H β	0.584	+	$\frac{1}{2}$ towards red	0.180
	,,	,,	,,	χ Ursæ Majoris F ...	0.508	—	$\frac{1}{10}$ towards blue	0.180
	,,	,,	,,	H β	0.531	—	$\frac{1}{10}$ towards blue	0.180

The day specified in the first column is the Solar Day in ordinary astronomical reckoning; the hours and minutes are those of Greenwich Sidereal Time.

Earth's Motion in Miles per Second.	Concluded Motion of Star in Miles per Second.		Weight.	REMARKS.
	Measured.	Estimated.		
+ 11'7	- 31'1	- 28'2	3	Definition fair.
+ 11'7	- 41'9	- 41'3	3	
0'0	- 0'9			The coincidence of the lines in the two spectra seemed to be perfect.
0'0	- 4'9			
0'0	+ 8'0			
0'0	+ 3'4			
0'0	- 1'5			
+ 9'3	- 21'6	- 20'5	4	Star-line very faint. The first two measures were made with the usual eye-piece, power 14; the last two with a magnifying power of 20.
+ 9'3	- 24'4	- 24'2	4	
+ 9'3	- 35'5	- 31'6	3	
+ 9'3	- 13'9	- 13'8	3	
+ 12'7	+ 23'7	+ 17'1	1	Star-line a little darker than in α Virginis, but spectrum faint, and definition bad.
+ 12'7	- 1'6	- 1'5	1	
0'0	+ 1'8			Definition poor. The coincidence of the lines in the two spectra seemed, however, to be perfect.
0'0	- 1'2			
+ 2'8	+ 12'3	+ 12'1	1	Spectrum faint. Definition bad.
+ 2'8	+ 16'9	+ 12'1	1	
+ 9'4	+ 15'9	+ 16'4	2	Star-line very diffused and hard to bisect. Images steady.
+ 9'4	+ 27'3	+ 29'3	2	
+ 9'6	+ 24'6	+ 29'1	2	Star-line very diffused and hard to bisect.
+ 9'6	+ 12'9	+ 22'6	2	
+ 11'1	- 14'8	- 17'6	2	Star-line diffused and hard to bisect.
+ 11'1	- 20'4	- 17'6	2	
+ 13'4	+ 21'1	+ 18'8	1	Spectrum faint. Star-line diffused and faint.
+ 13'4	- 20'5	- 19'9	1	

The velocity of light has been taken as 186 660 miles per second, and the distance of the Sun as 92 250 000 miles.
The sign + denotes recession; - approach.

Date, 1881, Greenwich Sidereal Time.	Observer.	Number of Half- Prisms.	Reading of Position Circle.	Objects compared.	Micrometer Readings.	Displacement.		Width of Slit.
						Measured.	Estimated in Terms of the Breadth of the Comparison Line.	
d h m June 22. 17. 30	M	2	275	Arcturus b_1	0'178	r		r
17. 55	"	"	"	Mg ₁	0'323	- 0'145	$\frac{1}{4}$ towards blue	0'094
	"	"	"	Arcturus b_1	0'912			
	"	"	"	Mg ₁	1'223	- 0'321	$\frac{1}{2}$ towards blue	0'094
June 22. 18. 5	M	1	275	ϵ Boötis b_1	1'001			
18. 10	"	"	"	Mg ₁	0'963	+ 0'038	$\frac{1}{5}$ towards red	0'094
	"	"	"	ϵ Boötis b_1	1'038			
	"	"	"	Mg ₁	0'959	+ 0'079	$\frac{2}{5}$ towards red	0'094
June 22. 18. 25	M	1	275	β Boötis b_1	0'745			
18. 35	"	"	"	Mg ₁	0'796	- 0'051	$\frac{2}{5}$ towards blue	0'094
	"	"	"	β Boötis b_1	0'619			
	"	"	"	Mg ₁	0'734	- 0'115	$\frac{2}{5}$ towards blue	0'094
June 22. 18. 50	M	1	275	α Herculis b_1	0'353			
19. 0	"	"	"	Mg ₃	0'260	+ 0'093	$\frac{1}{2}$ towards red	0'094
	"	"	"	α Herculis b_1	0'251			
	"	"	"	Mg ₃	0'228	+ 0'023	$\frac{1}{5}$ towards red	0'094
June 22. 19. 40	M	1	275	γ Draconis b_1	0'177			
19. 50	"	"	"	Mg ₁	0'128	+ 0'049	$\frac{1}{3}$ towards red	0'094
	"	"	"	γ Draconis b_1	0'149			
	"	"	"	Mg ₁	0'124	+ 0'025	$\frac{1}{4}$ towards red	0'094
June 23. 6. 0	M	1	275	Sky b_1	0'168			
	"	"	"	Mg ₁	0'172	- 0'004		0'094
	"	"	"	Sky b_1	0'108			
	"	"	"	Mg ₁	0'110	- 0'002		0'094
	"	"	"	Sky b_1	0'082			
	"	"	"	Mg ₁	0'084	- 0'002		0'094
June 23. 6. 20	M	2	275	Sky b_1	0'138			
	"	"	"	Mg ₁	0'209	- 0'071		0'094
	"	"	"	Sky b_1	0'242			
	"	"	"	Mg ₁	0'209	+ 0'033		0'094
	"	"	"	Sky b_1	0'219			
	"	"	"	Mg ₁	0'236	- 0'017		0'094
Sept. 7. 20. 50	M	1	6	α Cephei F	0'765			
21. 0	"	"	"	H β	0'968	- 0'203	$\frac{3}{5}$ towards blue	0'110
	"	"	"	α Cephei F	0'932			
	"	"	"	H β	1'021	- 0'089	$\frac{1}{2}$ towards blue	0'110
Sept. 14. 20. 40	M	1	6	α Lyrae F	0'019			
21. 10	"	"	"	H β	0'121	- 0'102	$\frac{1}{2}$ towards blue	0'206
	"	"	"	α Lyrae F	0'278			
	"	"	"	H β	0'338	- 0'060	$\frac{1}{4}$ towards blue	0'206
Sept. 14. 21. 40	M	1	6	α Cygni F	0'769			
22. 20	"	"	"	H β	0'668	+ 0'101	$\frac{1}{2}$ towards red	0'206
	"	"	"	α Cygni F	0'487			
	"	"	"	H β	0'596	- 0'109	$\frac{1}{2}$ towards blue	0'206
Sept. 19. 20. 50	M	1	6	ζ Aquilæ F	0'282			
21. 5	"	"	"	H β	0'226	- 0'056	$\frac{1}{4}$ towards blue	0'138
	"	"	"	ζ Aquilæ F	0'280			
	"	"	"	H β	0'228	- 0'054	$\frac{1}{4}$ towards blue	0'138
21. 25	"	"	"	ζ Aquilæ F	0'286			
	"	"	"	H β	0'297	+ 0'011	$\frac{1}{10}$ towards red	0'138

The day specified in the first column is the Solar Day in ordinary astronomical reckoning; the hours and minutes are those of Greenwich Sidereal Time.

Earth's Motion in Miles per Second.	Concluded Motion of Star in Miles per Second.		Weight.	REMARKS.
	Measured.	Estimated.		
+14.3	- 25.3	- 25.1	4	Definition variable, generally poor, but star-lines momentarily well seen.
+14.3	- 38.6	- 36.0	4	
+12.2	+ 2.6	+ 0.9	2	Definition variable.
+12.2	+ 18.6	+ 14.0	2	
+ 9.7	- 29.6	- 35.9	2	Definition variable.
+ 9.7	- 54.5	- 49.0	2	
+ 4.2	+ 32.0	+ 28.0	1	Definition very poor.
+ 4.2	+ 4.8	+ 8.7	1	
+ 0.4	+ 18.7	+ 21.4	1	Definition bad.
+ 0.4	+ 9.3	+ 16.0	1	
0.0	- 1.6			The coincidence of the lines in the two spectra seemed to be perfect.
0.0	- 0.8			
0.0	- 0.8			
0.0	- 5.4			The coincidence of the lines in the two spectra seemed to be perfect.
0.0	+ 2.5			
0.0	- 1.3			
- 2.8	- 59.8	- 47.3	2	Star-line faint, broad, and diffused. No central condensation.
- 2.8	- 24.7	- 39.0	3	
+ 8.0	- 39.4	- 31.2	2	Spectrum tremulous. Definition very bad.
+ 8.0	- 26.5	- 19.6	2	
+ 2.9	+ 28.2	+ 20.3	3	Spectrum a little steadier than for α Lyræ, but the definition still poor. Sky misty, and clouds constantly passing.
+ 2.9	- 36.5	- 26.1	2	
+13.7	- 31.0	- 25.9	3	Images steady. Star-line broad, diffused, and faint.
+13.7	- 30.4	- 25.9	3	
+13.7	- 10.3	- 8.8	3	

The velocity of light has been taken as 186 660 miles per second, and the distance of the Sun as 92 250 000 miles.
The sign + denotes recession; - approach.

Date, 1881, Greenwich Sidereal Time.	Observer.	Number of Half- Prisms.	Reading of Position Circle.	Objects compared.	Micrometer Readings.	Displacement.		Width of Slit.
						Measured.	Estimated in Terms of the Breadth of the Comparison Line.	
d h m Sept. 19. 22. 0	M	1	6	δ Aquilæ F.	0.232	r		r
22. 20	,,	,,	,,	H β	0.313	+ 0.081	$\frac{2}{5}$ towards red	0.138
				δ Aquilæ F.	0.476			
				H β	0.248	- 0.228	$1\frac{1}{4}$ towards blue	0.138
Sept. 19. 23. 0	M	1	6	ζ Pegasi F.	0.928			
23. 15	,,	,,	,,	H β	0.962	+ 0.034	$\frac{1}{4}$ towards red	0.138
23. 40	,,	,,	,,	ζ Pegasi F.	0.867			
				H β	0.972	+ 0.105	$\frac{3}{5}$ towards red	0.138
				ζ Pegasi F.	0.945			
				H β	0.912	- 0.033	$\frac{1}{4}$ towards blue	0.138
Sept. 19. 0. 15	M	1	6	Fomalhaut F.	0.281			
				H β	0.119	- 0.162	1 towards blue	0.138
Sept. 20. 12. 0	M	1	6	Sky F.	0.485			
	,,	,,	,,	H β	0.568	+ 0.083		0.138
	,,	,,	,,	Sky F.	0.567			
	,,	,,	,,	H β	0.558	- 0.009		0.138
	,,	,,	,,	Sky F.	0.623			
	,,	,,	,,	H β	0.632	+ 0.009		0.138
	,,	,,	,,	Sky F.	0.645			
	,,	,,	,,	H β	0.630	- 0.015		0.138
	,,	,,	,,	Sky F.	0.668			
	,,	,,	,,	H β	0.628	- 0.040		0.138
Sept. 30. 21. 0	M	1	6	α Ophiuchi F.	0.472			
21. 20	,,	,,	,,	H β	0.602	- 0.130	$\frac{1}{2}$ towards blue	0.147
				α Ophiuchi F.	0.503			
				H β	0.578	- 0.075	$\frac{1}{3}$ towards blue	0.147
Sept. 30. 21. 40	M	1	6	α Lyrae F.	0.345			
21. 55	,,	,,	,,	H β	0.420	- 0.075	$\frac{1}{4}$ towards blue	0.147
				α Lyrae F.	0.391			
				H β	0.423	- 0.032	$\frac{1}{4}$ towards blue	0.147
Sept. 30. 22. 15	M	1	6	γ Lyrae F.	0.242			
22. 40	,,	,,	,,	H β	0.368	- 0.126	$\frac{3}{4}$ towards blue	0.147
				γ Lyrae F.	0.354			
				H β	0.446	- 0.092	$\frac{1}{3}$ towards blue	0.147
Sept. 30. 22. 55	M	1	6	α Aquilæ F.	0.275			
23. 5	,,	,,	,,	H β	0.301	- 0.026	$\frac{1}{7}$ towards blue	0.147
23. 20	,,	,,	,,	α Aquilæ F.	0.233			
				H β	0.229	+ 0.004	Coincident	0.147
				α Aquilæ F.	0.219			
				H β	0.294	- 0.075	$\frac{1}{2}$ towards blue	0.147
Sept. 30. 23. 35	M	1	6	δ Cygni F.	0.343			
23. 45	,,	,,	,,	H β	0.325	+ 0.018	$\frac{1}{7}$ towards red	0.147
				δ Cygni F.	0.409			
				H β	0.332	+ 0.077	$\frac{1}{3}$ towards red	0.147
Sept. 30. 0. 10	M	1	6	α Pegasi F.	0.744			
0. 25	,,	,,	,,	H β	0.826	- 0.082	$\frac{1}{2}$ towards blue	0.147
				α Pegasi F.	0.582			
				H β	0.709	- 0.127	$\frac{3}{8}$ towards blue	0.147

The day specified in the first column is the Solar Day in ordinary astronomical reckoning; the hours and minutes are those of Greenwich Sidereal Time.

Earth's Motion in Miles per Second.	Concluded Motion of Star in Miles per Second.		Weight.	REMARKS.
	Measured.	Estimated.		
+ 15.0 + 15.0	+ 10.0 - 85.3	+ 4.6 - 76.2	0 0	Spectrum very faint. The two measures were made with such difficulty and under such constant interruption from passing cloud as to be practically worthless.
+ 3.8 + 3.8 + 3.8	+ 6.7 + 28.6 - 14.0	+ 8.4 + 25.6 - 16.0	2 2 3	Star-line fairly sharp, but faint. Observations interrupted by cloud.
+ 7.2	- 57.2	- 56.1	1	Observation very unsatisfactory.
0.0 0.0 0.0 0.0 0.0	+ 25.6 - 2.8 + 2.8 - 4.6 - 12.3			The coincidence of the lines in the two spectra appeared to be perfect.
+ 14.2 + 14.2	- 54.3 - 37.3	- 39.2 - 30.9	2 2	Spectrum bright, and fairly steady. But the star-line has no semblance of definiteness; it is a broad faint nebulous haze.
+ 8.6 + 8.6	- 31.7 - 18.5	- 31.1 - 21.1	3 3	Spectrum very bright, and fairly steady; but the star-line proved very difficult to bisect. It almost seemed as if any point within about 0.1 of the adopted readings would be an equally good bisection.
+ 10.3 + 10.3	- 49.2 - 38.7	- 47.7 - 27.0	1 1	Spectrum faint. Star-line very ill-defined.
+ 14.8 + 14.8 + 14.8	- 22.8 - 13.6 - 37.9	- 21.9 - 14.8 - 39.8	2 2 2	Spectrum tremulous. Star-line very ill-defined.
+ 6.3 + 6.3	- 0.7 + 17.4	+ 0.8 + 10.4	2 2	Star-line ill-defined at edges, but fairly dark. Spectrum faint, but steady.
+ 4.8 + 4.8	- 30.1 - 44.0	- 29.8 - 34.8	4 4	Spectrum steady. Star-line broad, and somewhat ill-defined at edges.

The velocity of light has been taken as 186 660 miles per second, and the distance of the Sun as 92 230 000 miles.
The sign + denotes recession; - approach.

Date, 1881, Greenwich Sidereal Time.	Observer.	Number of Half- Prisms.	Reading of Position Circle.	Objects compared.	Micrometer Readings.	Displacement.		Width of Slit.
						Measured.	Estimated in Terms of the Breadth of the Comparison Line.	
d h m Sept. 30. 0. 40	M	1	6	α Andromedæ F	0.088			
0. 55	"	"	"	H β	0.167	- 0.079	$\frac{1}{2}$ towards blue	0.147
1. 5	"	"	"	α Andromedæ F	0.062			
	"	"	"	H β	0.159	- 0.097	$\frac{2}{3}$ towards blue	0.147
	"	"	"	α Andromedæ F	0.088			
	"	"	"	H β	0.142	- 0.054	$\frac{1}{3}$ towards blue	0.147
Sept. 30. 12. 0	M	1	6	Sky F	0.209			
	"	"	"	H β	0.193	+ 0.016		0.147
	"	"	"	Sky F	0.188			
	"	"	"	H β	0.199	- 0.011		0.147
	"	"	"	Sky F	0.193			
	"	"	"	H β	0.204	- 0.011		0.147
	"	"	"	Sky F	0.208			
	"	"	"	H β	0.211	- 0.003		0.147
	"	"	"	Sky F	0.161			
	"	"	"	H β	0.167	- 0.006		0.147
Oct. 18. 1. 50	M	1	6	α Cygni b_1	0.930			
2. 10	"	"	"	Mg ₁	0.998	- 0.068	$\frac{1}{3}$ towards blue	0.239
	"	"	"	α Cygni b_1	0.937			
	"	"	"	Mg ₁	1.096	- 0.159	$\frac{2}{3}$ towards blue	0.239
Oct. 18. 2. 35	M	1	6	β Andromedæ b_1	0.458			
2. 50	"	"	"	Mg ₁	0.345	+ 0.113	$\frac{1}{2}$ towards red	0.239
	"	"	"	β Andromedæ b_1	0.473			
	"	"	"	Mg ₁	0.365	+ 0.108	$\frac{1}{2}$ towards red	0.239
Oct. 18. 3. 5	M	1	6	ζ Persei b_1	0.982			
3. 20	"	"	"	Mg ₁	1.046	- 0.064	$\frac{1}{4}$ towards blue	0.239
	"	"	"	ζ Persei b_1	0.005			
	"	"	"	Mg ₁	0.072	- 0.067	$\frac{1}{4}$ towards blue	0.239
Oct. 18. 3. 40	M	1	6	Aldebaran b_1	0.017			
3. 55	"	"	"	Mg ₁	0.013	+ 0.004	Coincident	0.239
4. 5	"	"	"	Aldebaran b_1	0.038			
	"	"	"	Mg ₁	0.026	+ 0.012	$\frac{1}{10}$ towards red	0.239
	"	"	"	Aldebaran b_1	0.119			
	"	"	"	Mg ₁	0.054	+ 0.065	$\frac{1}{4}$ towards red	0.239
Oct. 19. 14. 0	M	1	6	Sky b_1	0.721			
	"	"	"	Mg ₁	0.722	- 0.001		0.239
	"	"	"	Sky b_1	0.742			
	"	"	"	Mg ₁	0.718	+ 0.024		0.239
	"	"	"	Sky b_1	0.728			
	"	"	"	Mg ₁	0.732	- 0.004		0.239
	"	"	"	Sky b_1	0.726			
	"	"	"	Mg ₁	0.721	+ 0.005		0.239
	"	"	"	Sky b_1	0.722			
	"	"	"	Mg ₁	0.723	- 0.001		0.239
Oct. 25. 21. 50	M	1	6	β Cygni b_1	0.231			
22. 5	"	"	"	Mg ₁	0.219	+ 0.012	$\frac{1}{10}$ towards red	0.204
22. 20	"	"	"	β Cygni b_1	0.139			
	"	"	"	Mg ₁	0.209	- 0.070	$\frac{1}{3}$ towards blue	0.204
22. 30	"	"	"	β Cygni b_1	0.242			
	"	"	"	Mg ₁	0.152	+ 0.092	$\frac{1}{2}$ towards red	0.204
	"	"	"	β Cygni b_1	0.131			
	"	"	"	Mg ₁	0.133	- 0.007	Coincident	0.204

The day specified in the first column is the Solar Day in ordinary astronomical reckoning; the hours and minutes are those of Greenwich Sidereal Time.

Earth's Motion in Miles per Second.	Concluded Motion of Star in Miles per Second.		Weight.	REMARKS.
	Measured.	Estimated.		
— 1.3	— 23.0	— 23.7	4	Spectrum steady. Star-line dark, not very broad, and, though somewhat ill-defined at the edges, not very hard to bisect.
— 1.3	— 28.6	— 32.0	4	
— 1.3	— 15.4	— 15.4	4	
0.0	+ 4.9			The coincidence of the lines in the two spectra seemed to be perfect.
0.0	— 3.4			
0.0	— 3.4			
0.0	— 0.9			
0.0	— 1.8			
+ 7.3	— 33.8	— 36.7	2	Definition poor, although the spectrum was very bright. Observations continually interrupted by cloud.
+ 7.3	— 69.3	— 66.1	2	
— 0.8	+ 44.8	+ 44.9	4	Spectrum bright. Star-lines dark and fairly well-defined.
— 0.8	+ 42.9	+ 44.9	4	
— 10.6	— 14.3	— 11.4	2	Star-lines faint. Definition poor.
— 10.6	— 15.5	— 11.4	2	
— 12.4	+ 14.0	+ 12.4	4	Spectrum very bright. Star-lines dark and distinct.
— 12.4	+ 27.1	+ 21.2	4	
— 12.4	+ 37.7	+ 34.4	4	
0.0	— 0.4			The coincidence of the lines in the two spectra seemed to be perfect, so far as it was possible to compare them directly.
0.0	+ 9.3			
0.0	— 1.6			
0.0	+ 1.9			
0.0	— 0.4			
+ 12.2	— 7.5	— 3.7	3	Spectrum rather faint, star-lines exceedingly so. The measures, however, seemed to be good.
+ 12.2	— 39.5	— 40.5	3	
+ 12.2	+ 23.7	+ 30.3	3	
+ 12.2	— 14.9	— 12.2	3	

The velocity of light has been taken as 186 660 miles per second, and the distance of the Sun as 92 250 000 miles.
The sign + denotes recession; — approach.

Date, 1881, Greenwich Sidereal Time.	Observer.	Number of Half- Prisms.	Reading of Position Circle.	Objects compared.	Micrometer Readings.	Displacement.		Width of Slit.
						Measured.	Estimated in Terms of the Breadth of the Comparison Line.	
d h m Oct. 25. 23. 5	M	1	6	ζ Cygni b_1 Mg ₁	r 0.257 0.169	+ 0.088	$\frac{1}{2}$ towards red	r 0.204
Nov. 19. 0. 5	M	1	5	β Pegasi b_1 Mg ₁	0.436 0.402	+ 0.034	$\frac{1}{10}$ towards red	0.226
0. 15	,,	,,	,,	β Pegasi b_1 Mg ₁	0.432 0.417	+ 0.015	$\frac{1}{10}$ towards red	0.226
0. 30	,,	,,	,,	β Pegasi b_1 Mg ₁	0.407 0.409	- 0.002	Coincident	0.226
Nov. 19. 0. 55	M	1	5	δ Andromedæ b_1 Mg ₁	0.381 0.540	- 0.159	$\frac{3}{5}$ towards blue	0.226
1. 10	,,	,,	,,	δ Andromedæ b_1 Mg ₁	0.434 0.542	- 0.108	$\frac{2}{5}$ towards blue	0.226
Nov. 19. 1. 30	M	1	5	β Ceti b_1 Mg ₁	0.362 0.441	- 0.079	$\frac{2}{5}$ towards blue	0.226
1. 40	,,	,,	,,	β Ceti b_1 Mg ₁	0.343 0.427	- 0.084	$\frac{2}{5}$ towards blue	0.226
Nov. 19. 2. 5	M	1	5	β Andromedæ b_1 Mg ₁	0.488 0.544	- 0.056	$\frac{1}{4}$ towards blue	0.226
2. 25	,,	,,	,,	β Andromedæ b_1 Mg ₁	0.418 0.541	- 0.123	$\frac{1}{2}$ towards blue	0.226
Nov. 19. 2. 40	M	1	5	α Trianguli b_1 Mg ₁	0.675 0.517	+ 0.158	$\frac{2}{3}$ towards red	0.226
3. 0	,,	,,	,,	α Trianguli b_1 Mg ₁	0.658 0.495	+ 0.163	$\frac{2}{3}$ towards red	0.226
Nov. 19. 3. 10	M	1	5	α Arietis b_1 Mg ₁	0.469 0.491	- 0.022	$\frac{1}{10}$ towards blue	0.226
3. 15	,,	,,	,,	α Arietis b_1 Mg ₁	0.491 0.493	- 0.002	Coincident	0.226
3. 25	,,	,,	,,	α Arietis b_1 Mg ₁	0.493 0.492	+ 0.001	Coincident	0.226
Nov. 21. 16. 0	M	1	5	Sky b_1 Mg ₁	0.541 0.549	- 0.008		0.226
	,,	,,	,,	Sky b_1 Mg ₁	0.548 0.552	- 0.004		0.226
	,,	,,	,,	Sky b_1 Mg ₁	0.566 0.561	+ 0.005		0.226
	,,	,,	,,	Sky b_1 Mg ₁	0.558 0.567	- 0.009		0.226
	,,	,,	,,	Sky b_1 Mg ₁	0.563 0.552	+ 0.011		0.226
Nov. 22. 23. 50	M	1	5	β Pegasi b_1 Mg ₁	0.802 0.943	- 0.141	$\frac{2}{5}$ towards blue	0.188
23. 55	,,	,,	,,	β Pegasi b_1 Mg ₁	0.991 0.963	+ 0.028	$\frac{1}{7}$ towards red	0.188
0. 0	,,	,,	,,	β Pegasi b_1 Mg ₁	1.113 0.962	+ 0.151	$\frac{1}{2}$ towards red	0.188
0. 10	,,	,,	,,	β Pegasi b_4 Mg ₃	0.434 0.366	+ 0.068	$\frac{1}{3}$ towards red	0.188
0. 15	,,	,,	,,	β Pegasi b_4 Mg ₃	0.406 0.367	+ 0.039	$\frac{1}{4}$ towards red	0.188

The day specified in the first column is the Solar Day in ordinary astronomical reckoning ; the hours and minutes are those of Greenwich Sidereal Time.

1883GOAMM...43F...1A

Earth's Motion in Miles per Second.	Concluded Motion of Star in Miles per Second.		Weight.	REMARKS.
	Measured.	Estimated.		
+ 11.8	+ 22.5	+ 30.7	4	Spectrum faint, but star-line fairly well seen. Interrupted by cloud.
+ 14.0	- 0.8	- 4.3	2	The b_1 line in this star is faint and on a dark haze, and hence difficult to bisect.
+ 14.0	- 8.2	- 4.3	2	
+ 14.0	- 13.2	- 14.0	2	
+ 10.0	- 72.0	- 68.5	4	Spectrum faint and tremulous, but with moments of good definition.
+ 10.0	- 52.1	- 49.0	4	
+ 14.7	- 45.5	- 53.7	5	Spectrum generally tremulous, but star-lines well seen every now and then.
+ 14.7	- 47.4	- 53.7	5	
+ 8.2	- 30.0	- 32.6	3	Spectrum tremulous; definition variable. A large displacement towards the blue seems established.
+ 8.2	- 56.1	- 56.9	3	
+ 6.9	+ 54.7	+ 58.1	4	Spectrum faint, but steady.
+ 6.9	+ 56.6	+ 58.1	4	
+ 6.9	- 15.5	- 16.6	5	Definition very good.
+ 6.9	- 7.7	- 6.9	5	
+ 6.9	- 6.5	- 6.9	5	
0.0	- 3.1			The coincidence of the lines in the two spectra seemed to be perfect.
0.0	- 1.6			
0.0	+ 1.9			
0.0	- 3.5			
0.0	+ 4.3			
+ 14.4	- 69.4	- 75.7	1	The first measure appeared as good as the others, although it showed a displacement in the opposite direction.
+ 14.4	- 3.5	+ 0.2	1	
+ 14.4	+ 44.5	+ 36.7	1	
+ 14.4	+ 12.1	+ 21.1	1	
+ 14.4	+ 0.8	+ 12.2	1	

The velocity of light has been taken as 186 660 miles per second, and the distance of the Sun as 92 250 000 miles.
The sign + denotes recession; - approach.

Date, 1881, Greenwich Sidereal Time.	Observer.	Number of Half- Prisms.	Reading of Position Circle.	Objects compared.	Micrometer Readings.	Displacement.		Width of Slit.
						Measured.	Estimated in Terms of the Breadth of the Comparison Line.	
d h m			o		r	r		r
Nov. 22. 0. 25	M	1	5	η Pegasi b_1	0'899	— 0'133	$\frac{1}{2}$ towards blue	0'188
0. 40	"	"	"	Mg ₁	1'032			
0. 55	"	"	"	η Pegasi b_1	0'083	+ 0'035	$\frac{1}{10}$ towards red	0'188
1. 5	"	"	"	Mg ₁	0'048			
	"	"	"	η Pegasi b_1	0'049	+ 0'012	$\frac{1}{10}$ towards red	0'188
	"	"	"	Mg ₁	0'037			
	"	"	"	η Pegasi b_1	0'039	— 0'021	$\frac{1}{10}$ towards blue	0'188
	"	"	"	Mg ₁	0'060			
Nov. 22. 1. 20	M	1	5	δ Andromedæ b_1	0'480	+ 0'023	$\frac{1}{10}$ towards blue	0'188
1. 35	"	"	"	Mg ₁	0'457			
1. 45	"	"	"	δ Andromedæ b_1	0'402	— 0'049	$\frac{1}{5}$ towards blue	0'188
	"	"	"	Mg ₁	0'451			
	"	"	"	δ Andromedæ b_1	0'372	— 0'090	$\frac{1}{2}$ towards blue	0'188
	"	"	"	Mg ₁	0'462			
Nov. 22. 2. 10	M	1	5	β Andromedæ b_1	0'398	— 0'125	$\frac{1}{2}$ towards blue	0'188
2. 25	"	"	"	Mg ₁	0'523			
2. 40	"	"	"	β Andromedæ b_1	0'437	+ 0'009	$\frac{1}{10}$ towards red	0'188
2. 50	"	"	"	Mg ₁	0'428			
	"	"	"	β Andromedæ b_1	0'451	+ 0'035	$\frac{1}{5}$ towards red	0'188
	"	"	"	Mg ₁	0'416			
	"	"	"	β Andromedæ b_1	0'403	— 0'122	$\frac{1}{2}$ towards blue	0'188
	"	"	"	Mg ₁	0'525			
Nov. 22. 3. 5	M	1	5	ρ Persei b_4	0'090	— 0'091	$\frac{1}{2}$ towards blue	0'188
3. 20	"	"	"	Mg ₃	0'181			
3. 30	"	"	"	ρ Persei b_4	0'050	— 0'132	$\frac{3}{5}$ towards blue	0'188
	"	"	"	Mg ₃	0'182			
	"	"	"	ρ Persei b_4	0'135	— 0'051	$\frac{1}{5}$ towards blue	0'188
	"	"	"	Mg ₃	0'186			
Nov. 22. 3. 50	M	1	5	ϵ Tauri b_1	0'135	+ 0'053	$\frac{1}{4}$ towards red	0'188
4. 0	"	"	"	Mg ₁	0'082			
	"	"	"	ϵ Tauri b_1	0'126	+ 0'042	$\frac{1}{4}$ towards red	0'188
	"	"	"	Mg ₁	0'084			
Nov. 22. 4. 15	M	1	5	Aldebaran b_1	1'030	+ 0'098	$\frac{1}{2}$ towards red	0'188
4. 20	"	"	"	Mg ₁	0'932			
4. 30	"	"	"	Aldebaran b_1	1'012	+ 0'075	$\frac{1}{3}$ towards red	0'188
	"	"	"	Mg ₁	0'937			
	"	"	"	Aldebaran b_1	0'931	+ 0'006	Coincident	0'188
	"	"	"	Mg ₁	0'925			
Nov. 23. 17. 0	M	1	5	Sky b_1	0'528	+ 0'016		0'188
	"	"	"	Mg ₁	0'512			
	"	"	"	Sky b_1	0'484	— 0'005		0'188
	"	"	"	Mg ₁	0'489			
	"	"	"	Sky b_1	0'474	+ 0'001		0'188
	"	"	"	Mg ₁	0'473			
	"	"	"	Sky b_1	0'467	— 0'017		0'188
	"	"	"	Mg ₁	0'484			
	"	"	"	Sky b_1	0'483	+ 0'005		0'188
	"	"	"	Mg ₁	0'478			

The day specified in the first column is the Solar Day in ordinary astronomical reckoning; the hours and minutes are those of Greenwich Sidereal Time.

Earth's Motion in Miles per Second.	Concluded Motion of Star in Miles per Second.		Weight.	REMARKS.
	Measured.	Estimated.		
+ 14.1	- 65.9	- 65.2	0	Star-lines very faint, and definition very bad. Little or no reliance to be placed on these measures.
+ 14.1	- 0.5	- 3.9	0	
+ 14.1	- 9.4	- 3.9	0	
+ 14.1	- 22.3	- 24.3	0	
+ 11.2	- 2.2	- 1.0	2	Definition variable; best for the second measure.
+ 11.2	- 30.3	- 31.6	4	
+ 11.2	- 46.3	- 62.3	3	
+ 9.0	- 57.7	- 60.1	1	Definition poor.
+ 9.0	- 5.5	+ 1.2	1	
+ 9.0	+ 4.6	+ 11.4	1	
+ 9.0	- 56.6	- 60.1	1	
+ 2.3	- 37.8	- 55.5	1	The star-line b_4 was not distinctly isolated. Little reliance can therefore be placed on these measures.
+ 2.3	- 53.8	- 66.2	1	
+ 2.3	- 22.2	- 23.6	1	
- 1.9	+ 22.5	+ 27.5	3	Definition fair.
- 1.9	+ 18.3	+ 27.5	3	
- 2.3	+ 40.5	+ 53.4	4	Definition fair.
- 2.3	+ 31.5	+ 36.3	4	
- 2.3	+ 4.6	+ 2.3	4	
0.0	+ 6.2			The coincidence of the lines in the two spectra seemed to be perfect.
0.0	- 1.9			
0.0	+ 0.4			
0.0	- 6.6			
0.0	+ 1.9			

The velocity of light has been taken as 186 660 miles per second, and the distance of the Sun as 92 250 000 miles.
The sign + denotes recession; - approach.

Date, 1881, Greenwich Sidereal Time.	Observer.	Number of Half- Prisms.	Reading of Position Circle.	Objects compared.	Micrometer Readings.	Displacement.		Width of Slit.
						Measured.	Estimated in Terms of the Breadth of the Comparison Line.	
d h m			o		r	r		r
Nov. 28. 22. 50	M	1	6	Moon b_1	0.833			
				Mg ₁	0.834	— 0.001		0.161
22. 55	"	"	"	Moon b_1	0.834			
				Mg ₁	0.839	— 0.005		0.161
23. 0	"	"	"	Moon b_1	0.824			
				Mg ₁	0.820	+ 0.004		0.161
23. 10	"	"	"	Moon b_1	0.844			
				Mg ₁	0.832	+ 0.008		0.161
23. 15	"	"	"	Moon b_1	0.809			
				Mg ₁	0.824	— 0.015		0.161
Nov. 28. 23. 40	M	1	6	ζ Cygni b_1	0.448	— 0.124	$\frac{3}{8}$ towards blue	0.161
				Mg ₁	0.572			
23. 50	"	"	"	ζ Cygni b_1	0.667			
				Mg ₁	0.569	+ 0.098	$\frac{1}{2}$ towards red	0.161
0. 0	"	"	"	ζ Cygni b_1	0.573			
				Mg ₁	0.568	+ 0.005	Coincident	0.161
0. 10	"	"	"	ζ Cygni b_1	0.495			
				Mg ₁	0.564	— 0.069	$\frac{1}{3}$ towards blue	0.161
Nov. 28. 0. 30	M	1	6	η Pegasi b_1	0.982			
				Mg ₁	0.910	+ 0.072	$\frac{1}{3}$ towards red	0.161
0. 45	"	"	"	η Pegasi b_1	0.868			
				Mg ₁	0.868	0.000	Coincident	0.161
Nov. 28. 0. 55	M	1	6	β Ceti b_1	0.303			
				Mg ₁	0.335	— 0.032	$\frac{1}{4}$ towards blue	0.161
1. 5	"	"	"	β Ceti b_1	0.356			
				Mg ₁	0.351	+ 0.005	$\frac{1}{10}$ towards red	0.161
1. 15	"	"	"	β Ceti b_1	0.302			
				Mg ₁	0.345	— 0.043	$\frac{1}{8}$ towards blue	0.161
Nov. 28. 1. 25	M	1	6	α Ceti b_4	0.268			
				Mg ₃	0.278	— 0.010	Coincident	0.161
1. 35	"	"	"	α Ceti b_1	0.926			
				Mg ₁	0.914	+ 0.012	Coincident	0.161
1. 40	"	"	"	α Ceti b_1	0.886			
				Mg ₁	0.924	— 0.038	$\frac{1}{8}$ towards blue	0.161
Nov. 28. 1. 55	M	1	6	Aldebaran b_1	0.630			
				Mg ₁	0.564	+ 0.066	$\frac{1}{4}$ towards red	0.161
2. 5	"	"	"	Aldebaran b_1	0.593			
				Mg ₁	0.569	+ 0.024	$\frac{1}{10}$ towards red	0.161
Nov. 28. 2. 20	M	1	6	α Orionis b_1	0.636			
				Mg ₁	0.584	+ 0.052	$\frac{1}{4}$ towards red	0.161
2. 35	"	"	"	α Orionis b_1	0.707			
				Mg ₁	0.586	+ 0.121	$\frac{3}{8}$ towards red	0.161
Dec. 3. 0. 50	M	1	6	α Pegasi F	0.315			
				H β	0.298	+ 0.017	$\frac{1}{10}$ towards red	0.200
1. 5	"	"	"	α Pegasi F	0.274			
				H β	0.286	— 0.012	$\frac{1}{10}$ towards blue	0.200
Dec. 3. 1. 25	M	1	6	α Andromedæ F	0.127			
				H β	0.201	— 0.074	$\frac{1}{2}$ towards blue	0.200
1. 40	"	"	"	α Andromedæ F	0.005			
				H β	0.143	— 0.138	$\frac{4}{8}$ towards blue	0.200
1. 50	"	"	"	α Andromedæ	0.043			
				H β	0.145	— 0.102	$\frac{3}{8}$ towards blue	0.200

The day specified in the first column is the Solar Day in ordinary astronomical reckoning; the hours and minutes are those of Greenwich Sidereal Time.

Earth's Motion in Miles per Second.	Concluded Motion of Star in Miles per Second.		Weight.	REMARKS.
	Measured.	Estimated.		
0.0	- 0.4			The coincidence of the lines in the two spectra seemed to be perfect. The lines in both were sharp, well-defined, and showed no trace of being winged.
0.0	- 1.9			
0.0	+ 1.6			
0.0	+ 3.1			
0.0	- 5.9			
+ 13.6	- 61.9	- 63.6	0	Spectrum and star-lines very faint. Definition exceedingly bad. Measures practically worthless.
+ 13.6	+ 24.6	+ 28.1	0	
+ 13.6	- 11.7	- 13.6	0	
+ 13.6	- 40.5	- 41.4	0	
+ 14.8	+ 13.3	+ 13.0	1	Star-lines very faint. Definition bad.
+ 14.8	- 14.8	- 14.8	1	
+ 16.1	- 28.6	- 28.0	2	Star-lines faint. Definition poor.
+ 16.1	- 14.2	- 7.8	2	
+ 16.1	- 32.9	- 32.8	2	
+ 7.6	- 11.5	- 7.6	3	Definition poor.
+ 7.6	- 12.3	- 7.6	3	
+ 7.6	- 22.4	- 24.3	3	
- 0.4	+ 26.1	+ 21.3	4	Definition poor.
- 0.4	+ 9.7	+ 8.7	4	
- 6.3	+ 26.6	+ 26.9	3	Definition poor.
- 6.3	+ 53.5	+ 56.3	3	
+ 17.6	- 12.3	- 13.1	2	Star line dark, but very broad and ill-defined at edges. Direct comparison showed a displacement towards the blue.
+ 17.6	- 21.3	- 22.1	4	
+ 14.7	- 37.5	- 37.2	3	Star-line dark, but very broad, ill-defined, and nebulous. Definition poor. Direct comparison showed a large displacement towards the blue.
+ 14.7	- 57.2	- 50.6	3	
+ 14.7	- 46.1	- 41.7	3	

The velocity of light has been taken as 186 660 miles per second, and the distance of the Sun as 92 250 000 miles.
The sign + denotes recession; - approach.

Date, 1881, Greenwich Sidereal Time.	Observer.	Number of Half- Prisms.	Reading of Position Circle.	Objects compared.	Micrometer Readings.	Displacement.		Width of Slit.
						Measured.	Estimated in Terms of the Breadth of the Comparison Line.	
d h m			°		r	r		r
Dec. 3. 2. 0	M	1	6	γ Pegasi F	0'035			
				H β	0'058	— 0'023	$\frac{1}{7}$ towards blue	0'200
2. 10	"	"	"	γ Pegasi F	0'042	— 0'102	$\frac{3}{8}$ towards blue	0'200
2. 15	"	"	"	γ Pegasi F	0'040			
				H β	0'027	— 0'087	$\frac{1}{2}$ towards blue	0'200
Dec. 3. 2. 50	M	1	6	Moon F.	0'865			
				H β	0'876	— 0'011		0'200
2. 55	"	"	"	Moon F.	0'896			
				H β	0'894	+ 0'002		0'200
3. 0	"	"	"	Moon F.	0'941			
				H β	0'940	+ 0'001		0'200
3. 5	"	"	"	Moon F.	0'942			
				H β	0'942	0'000		0'200
3. 10	"	"	"	Moon F.	0'894			
				H β	0'926	— 0'032		0'200
Dec. 3. 3. 30	M	1	6	β Tauri F	0'827			
				H β	0'901	— 0'074	$\frac{1}{2}$ towards blue	0'200
3. 45	"	"	"	β Tauri F	0'860			
				H β	0'917	— 0'057	$\frac{1}{3}$ towards blue	0'200
3. 55	"	"	"	β Tauri F	0'898			
				H β	0'947	— 0'049	$\frac{1}{4}$ towards blue	0'200
Dec. 3. 4. 25	M	1	6	γ Orionis F	1'078			
				H β	0'988	+ 0'090	$\frac{1}{2}$ towards red	0'200
4. 35	"	"	"	γ Orionis F	0'935			
				H β	0'972	— 0'037	$\frac{1}{5}$ towards blue	0'200
4. 45	"	"	"	γ Orionis F	0'984			
				H β	0'986	— 0'002	Coincident	0'200
Dec. 7. 2. 35	M	1	6	α Pegasi F	0'042			
				H β	0'133	— 0'091	$\frac{1}{2}$ towards blue	0'187
2. 55	"	"	"	α Pegasi F	0'074			
				H β	0'138	— 0'064	$\frac{1}{4}$ towards blue	0'187
Dec. 7. 3. 10	M	1	6	α Andromedæ F	0'083			
				H β	0'175	— 0'092	$\frac{1}{2}$ towards blue	0'187
3. 25	"	"	"	α Andromedæ F	0'038			
				H β	0'152	— 0'114	$\frac{3}{5}$ towards blue	0'187
Dec. 7. 3. 40	M	1	6	β Cassiopeiae F	0'056			
				H β	0'169	— 0'113	$\frac{1}{2}$ towards blue	0'187
3. 50	"	"	"	β Cassiopeiae F	0'038			
				H β	0'138	— 0'100	$\frac{1}{2}$ towards blue	0'187
4. 5	"	"	"	β Cassiopeiae F	0'108			
				H β	0'165	— 0'057	$\frac{1}{3}$ towards blue	0'187
Dec. 7. 4. 15	M	1	6	γ Cassiopeiae F	0'108			
				H β	0'152	— 0'044	$\frac{1}{4}$ towards blue	0'187
4. 30	"	"	"	γ Cassiopeiae F	0'125			
				H β	0'163	— 0'038	$\frac{1}{5}$ towards blue	0'187
4. 45	"	"	"	γ Cassiopeiae F	0'105			
				H β	0'174	— 0'069	$\frac{1}{3}$ towards blue	0'187
Dec. 7. 5. 0	M	1	6	δ Cassiopeiae F	0'274			
				H β	0'198	+ 0'076	$\frac{1}{2}$ towards red	0'187
5. 10	"	"	"	δ Cassiopeiae F	0'243			
				H β	0'209	+ 0'034	$\frac{1}{5}$ towards red	0'187
The day specified in the first column is the Solar day in ordinary astronomical reckoning; the hours and minutes are those of Greenwich Sidereal Time.								

1883GOAMW...43F...1A

Earth's Motion in Miles per Second.	Concluded Motion of Star in Miles per Second.		Weight.	REMARKS.
	Measured.	Estimated.		
+ 16.7	- 23.8	- 23.1	3	Star-line faint, not so broad as that of α Pegasi, but more diffused at the edges. Direct comparison showed a large displacement towards the blue.
+ 16.7	- 48.1	- 43.7	3	
+ 16.7	- 43.5	- 39.2	3	
0.0	- 3.4			The coincidence between the lines in the two spectra seemed to be perfect.
0.0	+ 0.6			
0.0	+ 0.3			
0.0	0.0			
0.0	- 9.9			
- 2.9	- 19.9	- 19.6	2	Star-line dark, and, though broad, fairly well defined. Direct comparison showed that the displacement, if any, must be small, as it was not possible to ascertain in which direction it lay.
- 2.9	- 14.7	- 12.1	2	
- 2.9	- 12.2	- 8.4	2	
- 2.2	+ 30.0	+ 24.7	2	Definition poor.
- 2.2	- 9.2	- 6.8	2	
- 2.2	+ 1.6	+ 2.2	2	
+ 17.7	- 45.8	- 45.0	5	Star-line broad and ill-defined at edges. Several direct comparisons showed a distinct displacement towards the blue.
+ 17.7	- 37.4	- 31.3	5	
+ 15.3	- 43.7	- 42.6	4	Direct comparisons gave a slight displacement towards the blue; it was difficult to estimate the amount, but the impression given was that the measures were rather too large. The star-line, however, seemed fairly well defined, and the measures to deserve an average weight.
+ 15.3	- 50.4	- 48.0	4	
+ 8.1	- 42.9	- 35.4	0	Star-line not very broad, but very difficult to bisect. It was difficult to make a satisfactory direct comparison, but despite the measures the star-line seemed to be slightly displaced towards the red.
+ 8.1	- 38.9	- 35.4	0	
+ 8.1	- 25.7	- 26.3	0	
+ 6.9	- 20.5	- 20.5	3	The star-line, owing to its being bright instead of dark, proved difficult to bisect. Direct comparison showed a very small displacement towards the blue.
+ 6.9	- 18.5	- 17.8	3	
+ 6.9	- 28.2	- 25.1	3	
+ 6.5	+ 16.9	+ 20.8	3	Star-line very broad. Direct comparison, made with difficulty on account of the faintness of the spectrum, showed a considerable displacement towards the red.
+ 6.5	+ 4.0	+ 4.4	3	

The velocity of light has been taken as 186 660 miles per second, and the distance of the Sun as 92 250 000 miles.
The sign + denotes recession; - approach.

Date, 1881, Greenwich Sidereal Time.	Observer.	Number of Half- Prisms.	Reading of Position Circle.	Objects compared.	Micrometer Readings.	Displacement.		Width of Slit.
						Measured.	Estimated in Terms of the Breadth of the Comparison Line.	
d h m			°		r	r		r
Dec. 7. 5. 30	M	1	6	Rigel F.....	0.388			
				H β	0.338	+ 0.050	$\frac{1}{4}$ towards red	0.187
5. 40	,,	,,	,,	Rigel F.....	0.392			
				H β	0.364	+ 0.028	$\frac{1}{5}$ towards red	0.187
5. 55	,,	,,	,,	Rigel F.....	0.394			
				H β	0.347	+ 0.047	$\frac{1}{4}$ towards red	0.187
Dec. 7. 6. 5	M	1	6	Sirius F.....	0.168			
				H β	0.265	- 0.097	$\frac{1}{2}$ towards red	0.187
6. 15	,,	,,	,,	Sirius F.....	0.192			
				H β	0.277	- 0.085	$\frac{1}{2}$ towards red	0.187
Dec. 7. 6. 40	M	1	6	Moon F.....	0.098			
				H β	0.078	+ 0.020		0.187
6. 45	,,	,,	,,	Moon F.....	0.119			
				H β	0.144	- 0.025		0.187
6. 50	,,	,,	,,	Moon F.....	0.108			
				H β	0.128	- 0.020		0.187
6. 55	,,	,,	,,	Moon F.....	0.107			
				H β	0.109	- 0.002		0.187
7. 0	,,	,,	,,	Moon F.....	0.103			
				H β	0.096	+ 0.007		0.187

The day specified in the first column is the Solar Day in ordinary astronomical reckoning ; the hours and minutes are those of Greenwich Sidereal Time.

Earth's Motion in Miles per Second.	Concluded Motion of Star in Miles per Second.		Weight.	REMARKS.
	Measured.	Estimated.		
+ 0.3	+ 15.1	+ 13.3	5	Spectrum bright, but tremulous. Direct comparison showed a very small displacement towards the red.
+ 0.3	+ 8.3	+ 10.6	5	
+ 0.3	+ 14.2	+ 13.3	5	
- 6.4	- 23.5	- 20.9		Spectrum very bright. Star-lines well seen. Direct comparison distinctly and fully confirmed these measures, though the displacement is in an opposite sense to that found on all previous occasions. With the two-prism train a similar result was obtained.
- 6.4	- 19.8	- 20.9		
0.0	+ 6.2			The coincidence of the lines in the two spectra seemed to be perfect, and everything seemed to be in good adjustment.
0.0	- 7.7			
0.0	- 6.2			
0.0	- 0.6			
0.0	+ 2.2			

The velocity of light has been taken as 186 660 miles per second, and the distance of the Sun as 92 250 000 miles.
The sign + denotes recession; - approach.

46 COLLECTED RESULTS FOR MOTIONS OF STARS IN THE LINE OF SIGHT, FROM SPECTROSCOPIC OBSERVATIONS

COLLECTED RESULTS for MOTIONS of STARS in the line of Sight, from SPECTROSCOPIC OBSERVATIONS made at the ROYAL OBSERVATORY, GREENWICH, in the Year 1881.

(F for the Star is compared with H_{β} of Hydrogen, and b_1, b_2, b_4 with Mg_1, Mg_2, Mg_3 of Magnesium.)

(+ denotes Recession; - Approach.)

Date.	Observer.	Weight.	Number of Half-Prisms.	Position Circle.	Width of Slit.	Line.	Earth's Motion in Miles per Second.	Concluded Motion of Star.		
								Measured.	Estimated.	
α ANDROMEDÆ.										
1881, September 30	M	4	1	6	0.147	F	- 1.3	- 23.0	- 23.7	
	M	4	1	6	0.147	F	- 1.3	- 28.6	- 32.0	
	M	4	1	6	0.147	F	- 1.3	- 15.4	- 15.4	
December 3	M	3	1	6	0.200	F	+ 14.7	- 37.5	- 37.2	
	M	3	1	6	0.200	F	+ 14.7	- 57.2	- 50.6	
	M	3	1	6	0.200	F	+ 14.7	- 46.1	- 41.7	
7	M	4	1	6	0.187	F	+ 15.3	- 43.7	- 42.6	
	M	4	1	6	0.187	F	+ 15.3	- 50.4	- 48.0	
γ PEGASI.										
1881, December 3	M	3	1	6	0.200	F	+ 16.7	- 23.8	- 23.1	
	M	3	1	6	0.200	F	+ 16.7	- 48.1	- 43.7	
	M	3	1	6	0.200	F	+ 16.7	- 43.5	- 39.2	
δ ANDROMEDÆ.										
1881, November 19	M	4	1	5	0.226	b_1	+ 10.0	- 72.0	- 68.5	
	M	4	1	5	0.226	b_1	+ 10.0	- 52.1	- 49.0	
22	M	2	1	5	0.188	b_1	+ 11.2	- 2.2	- 1.0	
	M	4	1	5	0.188	b_1	+ 11.2	- 30.3	- 31.6	
	M	3	1	5	0.188	b_1	+ 11.2	- 46.3	- 62.3	
β CETI.										
1881, November 19	M	5	1	5	0.226	b_1	+ 14.7	- 45.5	- 53.7	
	M	5	1	5	0.226	b_1	+ 14.7	- 47.4	- 53.7	
28	M	2	1	6	0.161	b_1	+ 16.1	- 28.6	- 28.0	
	M	2	1	6	0.161	b_1	+ 16.1	- 14.2	- 7.8	
	M	2	1	6	0.161	b_1	+ 16.1	- 32.9	- 32.8	
γ CASSIOPEÆ.										
1881, December 7	M	3	1	6	0.187	F	+ 6.9	- 20.5	- 20.5	
	M	3	1	6	0.187	F	+ 6.9	- 18.5	- 17.8	
	M	3	1	6	0.187	F	+ 6.9	- 28.2	- 25.1	

Date.	Observer.	Weight.	Number of Half-Prisms.	Position Circle.	Width of Slit.	Line.	Earth's Motion in Miles per Second.	Concluded Motion of Star.		
								Measured.	Estimated.	
β ANDROMEDÆ.										
1881, October	18	M	4	1	6	0.239	b_1	— 0.8	+ 44.8	+ 44.9
		M	4	1	6	0.239	b_1	— 0.8	+ 42.9	+ 44.9
November	19	M	3	1	5	0.226	b_1	+ 8.2	— 30.0	— 32.6
		M	3	1	5	0.226	b_1	+ 8.2	— 56.1	— 56.9
	22	M	1	1	5	0.188	b_1	+ 9.0	— 57.7	— 60.1
		M	1	1	5	0.188	b_1	+ 9.0	— 5.5	+ 1.2
		M	1	1	5	0.188	b_1	+ 9.0	+ 4.6	+ 11.4
		M	1	1	5	0.188	b_1	+ 9.0	— 56.6	— 60.1
δ CASSIOPEÆ.										
1881, December	7	M	3	1	6	0.187	F	+ 6.5	+ 16.9	+ 20.8
		M	3	1	6	0.187	F	+ 6.5	+ 4.0	+ 4.4
α TRIANGULI.										
1881, November	19	M	4	1	5	0.226	b_1	+ 6.9	+ 54.7	+ 58.1
		M	4	1	5	0.226	b_1	+ 6.9	+ 56.6	+ 58.1
α ARIETIS.										
1881, November	19	M	5	1	5	0.226	b_1	+ 6.9	— 15.5	— 16.6
		M	5	1	5	0.226	b_1	+ 6.9	— 7.7	— 6.9
		M	5	1	5	0.226	b_1	+ 6.9	— 6.5	— 6.9
α CETI.										
1881, November	28	M	3	1	6	0.161	b_4	+ 7.6	— 11.5	— 7.6
		M	3	1	6	0.161	b_1	+ 7.6	— 12.3	— 7.6
		M	3	1	6	0.161	b_1	+ 7.6	— 22.4	— 24.3
ρ PERSEI.										
1881, November	22	M	1	1	5	0.188	b_4	+ 2.3	— 37.8	— 55.5
		M	1	1	5	0.188	b_4	+ 2.3	— 53.8	— 66.2
		M	1	1	5	0.188	b_4	+ 2.3	— 22.2	— 23.6
ζ PERSEI.										
1881, October	18	M	2	1	6	0.239	b_1	— 10.6	— 14.3	— 11.4
		M	2	1	6	0.239	b_1	— 10.6	— 15.5	— 11.4

48 COLLECTED RESULTS FOR MOTIONS OF STARS IN THE LINE OF SIGHT, FROM SPECTROSCOPIC OBSERVATIONS

Date.	Observer.	Weight.	Number of Half-Prisms.	Position Circle.	Width of Slit.	Line.	Earth's Motion in Miles per Second.	Concluded Motion of Star.	
								Measured.	Estimated.
ε TAURI.									
1881, November 22	M	3	1	0	r				
	M	3	1	5	0.188	b ₁	- 1.9	+ 22.5	+ 27.5
				5	0.188	b ₁	- 1.9	+ 18.3	+ 27.5
α TAURI (<i>Aldebaran</i>).									
1881, March 28	M	2	1	275	0.205	b ₁	+ 15.8	+ 78.6	+ 102.7
	M	2	1	275	0.205	b ₁	+ 15.8	+ 71.9	+ 102.7
31	M	5	1	275	0.180	b ₁	+ 15.3	+ 94.7	+ 62.3
	M	5	1	275	0.180	b ₁	+ 15.3	+ 78.7	+ 62.3
April 7	M	5	1	275	0.180	b ₁	+ 15.3	+ 85.3	+ 62.3
	M	3	2	275	0.170	b ₁	+ 13.9	+ 26.0	+ 24.6
October 18	M	3	2	275	0.170	b ₁	+ 13.9	+ 24.4	+ 24.0
	M	4	1	6	0.239	b ₁	- 12.4	+ 14.0	+ 12.4
	M	4	1	6	0.239	b ₁	- 12.4	+ 27.1	+ 21.2
	M	4	1	6	0.239	b ₁	- 12.4	+ 37.7	+ 34.4
November 22	M	4	1	5	0.188	b ₁	- 2.3	+ 40.5	+ 53.4
	M	4	1	5	0.188	b ₁	- 2.3	+ 31.5	+ 36.3
28	M	4	1	5	0.188	b ₁	- 2.3	+ 4.6	+ 2.3
	M	4	1	6	0.161	b ₁	- 0.4	+ 26.1	+ 21.3
	M	4	1	6	0.161	b ₁	- 0.4	+ 9.7	+ 8.7
α AURIGÆ (<i>Capella</i>).									
1881, March 31	M	4	1	275	0.180	b ₁	+ 15.8	+ 21.2	+ 23.0
	M	4	1	275	0.180	b ₁	+ 15.8	+ 16.5	+ 23.0
April 6	WC	3	1	275	0.150	b ₁	+ 15.0		+ 51.0
	WC	3	1	275	0.150	b ₁	+ 15.0		+ 58.3
7	M	5	2	275	0.170	b ₁	+ 14.9	+ 37.1	+ 36.4
	M	5	2	275	0.170	b ₁	+ 14.9	+ 37.3	+ 36.4
	M	5	2	275	0.170	b ₁	+ 14.9	+ 27.1	+ 27.9
	M	5	2	275	0.170	b ₁	+ 14.9	+ 28.2	+ 31.7
β ORIONIS (<i>Rigel</i>).									
1881, February 28	M	1	1	95	0.110	F	+ 16.0	+ 12.4	+ 19.9
	M	1	1	95	0.110	F	+ 16.0	+ 15.1	+ 19.9
March 14	M	3	1	95	0.208	F	+ 15.7	+ 31.5	+ 21.8
	M	3	1	95	0.208	F	+ 15.7	+ 32.4	+ 21.8
December 7	M	5	1	6	0.187	F	+ 0.3	+ 15.1	+ 13.3
	M	5	1	6	0.187	F	+ 0.3	+ 8.3	+ 10.6
	M	5	1	6	0.187	F	+ 0.3	+ 14.2	+ 13.3
γ ORIONIS.									
1881, December 3	M	2	1	6	0.200	F	- 2.2	+ 30.0	+ 24.7
	M	2	1	6	0.200	F	- 2.2	- 9.2	- 6.8
	M	2	1	6	0.200	F	- 2.2	+ 1.6	+ 2.2

Date.	Observer.	Weight.	Number of Half-Prisms.	Position Circle.	Width of Slit.	Line.	Earth's Motion in Miles per Second.	Concluded Motion of Star.		
								Measured.	Estimated.	
β TAURI.										
1881, April	9	M	5	1	275	0'300	F	+ 15'9	+ 5'1	+ 17'4
		M	5	1	275	0'300	F	+ 15'9	+ 26'6	+ 44'0
		M	5	1	275	0'300	F	+ 15'9	+ 13'7	+ 34'1
December	3	M	2	1	6	0'200	F	— 2'9	— 19'9	— 19'6
		M	2	1	6	0'200	F	— 2'9	— 14'7	— 12'1
		M	2	1	6	0'200	F	— 2'9	— 12'2	— 8'4
α ORIONIS.										
1881, March	31	M	2	1	275	0'180	b_4	+ 17'1	+ 13'3	+ 22'5
		M	2	1	275	0'180	b_4	+ 17'1	+ 23'8	+ 22'5
		M	2	1	275	0'180	b_1	+ 17'1	— 1'9	+ 2'3
		M	4	1	275	0'180	b_1	+ 17'1	+ 35'9	+ 29'5
April	7	M	4	2	275	0'170	b_1	+ 16'4	— 0'4	+ 5'0
		M	4	2	275	0'170	b_1	+ 16'4	+ 6'1	+ 9'3
		M	4	2	275	0'170	b_4	+ 16'4	+ 30'1	+ 24'4
		M	4	2	275	0'170	b_4	+ 16'4	+ 6'5	+ 10'8
November	28	M	3	1	6	0'161	b_1	— 6'3	+ 26'6	+ 26'9
		M	3	1	6	0'161	b_1	— 6'3	+ 53'5	+ 56'3
β AURIGÆ.										
1881, April	9	M	4	1	275	0'300	F	+ 15'8	+ 2'1	+ 9'2
		M	4	1	275	0'300	F	+ 15'8	— 13'7	— 15'8
γ GEMINORUM.										
1881, February	28	M	1	1	95	0'110	F	+ 16'5	+ 11'0	+ 19'4
		M	1	1	95	0'110	F	+ 16'5	— 7'6	— 4'5
March	14	M	2	1	95	0'208	F	+ 18'0	+ 8'5	+ 14'8
		M	1	1	95	0'208	F	+ 18'0	+ 29'8	+ 25'8
α CANIS MAJORIS (<i>Sirius</i>).										
1881, February	16	M	1	1	270	0'178	F	+ 10'4	+ 9'6	+ 11'8
		M	1	1	270	0'178	F	+ 10'4	+ 3'5	+ 11'8
	28	M	2	1	95	0'110	F	+ 12'2	+ 3'5	+ 11'8
		M	2	1	95	0'110	F	+ 12'2	+ 14'6	+ 23'7
December	7	M	1	1	6	0'187	F	— 6'4	— 23'5	— 20'9
		M	1	1	6	0'187	F	— 6'4	— 19'8	— 20'9

GREENWICH OBSERVATIONS, 1881.

5 G

50 COLLECTED RESULTS FOR MOTIONS OF STARS IN THE LINE OF SIGHT, FROM SPECTROSCOPIC OBSERVATIONS

Date.	Observer.	Weight.	Number of Half-Prisms.	Position Circle.	Width of Slit.	Line.	Earth's Motion in Miles per Second.	Concluded Motion of Star.		
								Measured.	Estimated.	
α CANIS MINORIS (<i>Procyon</i>).										
1881, February	16	M	2	1	270	0.178	F	+ 10.2	+ 39.5	+ 43.1
		M	2	1	270	0.178	F	+ 10.2	+ 18.8	+ 23.1
	28	M	4	1	95	0.110	F	+ 13.0	+ 3.1	+ 2.0
		M	4	1	95	0.110	F	+ 13.0	+ 1.8	+ 2.0
March	14	M	3	1	95	0.208	F	+ 15.6	+ 13.1	+ 17.2
		M	2	1	95	0.208	F	+ 15.6	+ 31.0	+ 28.2
April	9	M	5	1	275	0.300	F	+ 17.6	+ 45.9	+ 57.4
		M	5	1	275	0.300	F	+ 17.6	+ 29.6	+ 49.0
		M	4	2	275	0.300	F	+ 17.6	+ 17.1	+ 6.8
		M	3	2	275	0.300	F	+ 17.6	+ 12.1	+ 0.7
β GEMINORUM (<i>Pollux</i>).										
1881, March	25	M	2	1	275	0.232	b_1	+ 17.5	- 71.7	- 82.4
		M	2	1	275	0.232	b_1	+ 17.5	- 17.9	- 17.5
		M	1	1	275	0.232	b_1	+ 17.5	- 77.5	- 82.4
		M	1	1	275	0.232	b_1	+ 17.5	- 15.9	- 17.5
	28	M	3	1	275	0.205	b_1	+ 17.7	- 0.2	+ 11.9
		M	3	1	275	0.205	b_1	+ 17.7	+ 17.8	+ 21.8
April	7	M	2	2	275	0.170	b_1	+ 18.1	- 34.5	- 39.5
		M	2	2	275	0.170	b_4	+ 18.1	- 2.9	+ 2.3
		M	2	2	275	0.170	b_1	+ 18.1	- 17.7	- 18.1
		M	3	2	275	0.170	b_1	+ 18.1	- 10.0	- 9.5
		M	3	2	275	0.170	b_1	+ 18.1	- 12.2	- 13.8
α HYDRÆ.										
1881, March	31	M	2	1	275	0.180	b_1	+ 12.2	- 9.1	- 4.4
		M	2	1	275	0.180	b_1	+ 12.2	- 16.1	- 20.0
ϵ LEONIS.										
1881, March	25	M	2	1	275	0.232	b_1	+ 13.2	+ 18.4	+ 19.3
		M	2	1	275	0.232	b_1	+ 13.2	- 3.9	- 0.2
α LEONIS (<i>Regulus</i>).										
1881, May	11	M	1	1	5	0.218	F	+ 17.9	- 23.5	- 22.9
		M	4	1	5	0.218	F	+ 17.9	+ 1.8	+ 1.8
		M	4	1	5	0.218	F	+ 17.9	+ 3.1	+ 6.8
γ_1 LEONIS.										
1881, March	25	M	1	1	275	0.232	b_1	+ 11.1	+ 31.4	+ 40.8
		M	1	1	275	0.232	b_1	+ 11.1	+ 11.9	+ 14.9

Date.		Observer.	Weight.	Number of Half-Prisms.	Position Circle.	Width of Slit.	Line.	Earth's Motion in Miles per Second.	Concluded Motion of Star.	
									Measured.	Estimated.
δ LEONIS.										
1881, May	6	M	1	1	5	0'202	F	+ 16'0	+ 15'4	+ 11'4
		M	1	1	5	0'202	F	+ 16'0	+ 2'5	+ 2'3
	11	M	4	1	275	0'218	F	+ 16'6	+ 20'1	+ 20'4
		M	4	1	275	0'218	F	+ 16'6	+ 16'1	+ 16'3
χ URSAE MAJORIS.										
1881, May	20	M	1	1	5	0'180	F	+ 13'4	+ 21'1	+ 18'8
		M	1	1	5	0'180	F	+ 13'4	- 20'5	- 19'9
β LEONIS.										
1881, May	4	M	3	1	5	0'162	F	+ 13'1	+ 10'9	+ 12'4
		M	3	1	5	0'162	F	+ 13'1	- 34'4	- 32'2
		M	3	1	5	0'162	F	+ 13'1	- 4'5	- 5'5
	11	M	1	1	5	0'218	F	+ 15'5	- 28'1	- 27'8
		M	1	1	5	0'218	F	+ 15'5	- 39'8	- 40'2
β VIRGINIS.										
1881, March	25	M	1	1	275	0'232	b ₁	+ 3'3	- 49'7	- 68'2
		M	1	1	275	0'232	b ₁	+ 3'3	- 35'6	- 46'6
δ URSAE MAJORIS.										
1881, May	20	M	2	1	5	0'180	F	+ 11'1	- 14'8	- 17'6
		M	2	1	5	0'180	F	+ 11'1	- 20'4	- 17'6
γ VIRGINIS.										
1881, May	4	M	3	1	275	0'162	F	+ 10'6	+ 23'9	+ 27'6
	13	M	1	1	5	0'180	F	+ 12'7	+ 23'7	+ 17'1
		M	1	1	5	0'180	F	+ 12'7	- 1'6	- 1'5
α CANUM VENATICORUM.										
1881, May	11	M	3	1	5	0'218	F	+ 11'7	- 31'1	- 28'2
		M	3	1	5	0'218	F	+ 11'7	- 41'9	- 41'3
ε VIRGINIS.										
1881, March	31	M	1	1	275	0'180	b ₁	+ 10'1	- 17'1	- 17'9
		M	1	1	275	0'180	b ₁	+ 10'1	+ 3'9	+ 9'3

52 COLLECTED RESULTS FOR MOTIONS OF STARS IN THE LINE OF SIGHT, FROM SPECTROSCOPIC OBSERVATIONS

Date.	Observer.	Weight.	Number of Half-Prisms.	Position Circle.	Width of Slit.	Line.	Earth's Motion in Miles per Second.	Concluded Motion of Star.		
								Measured.	Estimated.	
α VIRGINIS (<i>Spica</i>).										
1881, May	13	M	4	1	5	0.180	F	+ 9.3	— 21.6	— 20.5
		M	4	1	5	0.180	F	+ 9.3	— 24.4	— 24.2
		M	3	1	5	0.180	F	+ 9.3	— 35.5	— 31.6
		M	3	1	5	0.180	F	+ 9.3	— 13.9	— 13.8
ζ URSÆ MAJORIS.										
1881, May	20	M	2	1	5	0.180	F	+ 9.6	+ 24.6	+ 29.1
		M	2	1	5	0.180	F	+ 9.6	+ 12.9	+ 22.6
η URSÆ MAJORIS.										
1881, May	20	M	2	1	5	0.180	F	+ 9.4	+ 15.9	+ 16.4
		M	2	1	5	0.180	F	+ 9.4	+ 27.3	+ 29.3
α BOÖTIS (<i>Arcturus</i>).										
1881, June	22	M	4	2	275	0.094	b_1	+ 14.3	— 25.3	— 25.1
		M	4	2	275	0.094	b_1	+ 14.3	— 38.6	— 36.0
ϵ_2 BOÖTIS.										
1881, June	22	M	2	1	275	0.094	b_1	+ 12.2	+ 2.6	+ 0.9
		M	2	1	275	0.094	b_1	+ 12.2	+ 18.6	+ 14.0
β BOÖTIS.										
1881, June	22	M	2	1	275	0.094	b_1	+ 9.7	— 29.6	— 35.9
		M	2	1	275	0.094	b_1	+ 9.7	— 54.5	— 49.0
β LIBRÆ.										
1881, May	6	M	2	1	5	0.202	F	— 0.4	— 32.0	— 30.0
		M	2	1	5	0.202	F	— 0.4	— 37.8	— 30.0
α CORONÆ.										
1881, May	13	M	1	1	5	0.180	F	+ 2.8	+ 12.3	+ 12.1
		M	1	1	5	0.180	F	+ 2.8	+ 16.9	+ 12.1
γ HERCULIS.										
1881, May	6	M	1	1	275	0.202	F	— 2.6	— 27.3	— 24.8

Date.	Observer.	Weight.	Number of Half-Prisms.	Position Circle.	Width of Slit.	Line.	Earth's Motion in Miles per Second.	Concluded Motion of Star.		
								Measured.	Estimated.	
α HERCULIS.										
1881, June	22	M	1	1	0	r				
		M	1	1	275	0'094	b_4	+ 4'2	+ 32'0	+ 28'0
					275	0'094	b_4	+ 4'2	+ 4'8	+ 8'7
α OPHIUCHI.										
1881, September	30	M	2	1	6	0'147	F	+ 14'2	- 54'3	- 39'2
		M	2	1	6	0'147	F	+ 14'2	- 37'3	- 30'9
γ DRACONIS.										
1881, June	22	M	2	1	275	0'094	b_1	+ 0'4	+ 18'7	+ 21'4
		M	2	1	275	0'094	b_1	+ 0'4	+ 9'3	+ 16'0
α LYRÆ (<i>Vega</i>).										
1881, September	14	M	2	1	6	0'206	F	+ 8'0	- 39'4	- 31'2
		M	2	1	6	0'206	F	+ 8'0	- 26'5	- 19'6
	30	M	3	1	6	0'147	F	+ 8'6	- 31'7	- 31'1
		M	3	1	6	0'147	F	+ 8'6	- 18'5	- 21'1
γ LYRÆ.										
1881, September	30	M	1	1	6	0'147	F	+ 10'3	- 49'2	- 47'7
		M	1	1	6	0'147	F	+ 10'3	- 38'7	- 27'0
ζ AQUILÆ.										
1881, September	19	M	3	1	6	0'138	F	+ 13'7	- 31'0	- 25'9
		M	3	1	6	0'138	F	+ 13'7	- 30'4	- 25'9
		M	3	1	6	0'138	F	+ 13'7	- 10'3	- 8'8
β CYGNI.										
1881, October	25	M	3	1	6	0'204	b_1	+ 12'2	- 7'5	- 3'7
		M	3	1	6	0'204	b_1	+ 12'2	- 39'5	- 40'5
		M	3	1	6	0'204	b_1	+ 12'2	+ 23'7	+ 30'3
		M	3	1	6	0'204	b_1	+ 12'2	- 14'9	- 12'2

54 COLLECTED RESULTS FOR MOTIONS OF STARS IN THE LINE OF SIGHT, FROM SPECTROSCOPIC OBSERVATIONS

Date.	Observer.	Weight.	Number of Half-Prisms.	Position Circle.	Width of Slit.	Line.	Earth's Motion in Miles per Second.	Concluded Motion of Star.		
								Measured.	Estimated.	
δ CYGNI.										
1881, September 30	M M	2 2	1 1	6 6	0.147 0.147	F F	+ 6.3 + 6.3	— 0.7 + 17.4	+ 0.8 + 10.4	
α AQUILÆ (<i>Altair</i>).										
1881, September 30	M M M	2 2 2	1 1 1	6 6 6	0.147 0.147 0.147	F F F	+ 14.8 + 14.8 + 14.8	— 22.8 — 13.6 — 37.9	— 21.9 — 14.8 — 39.8	
α CYGNI.										
1881, September 14 October 18	M M M M	3 2 2 2	1 1 1 1	6 6 6 6	0.206 0.206 0.239 0.239	F F <i>b</i> ₁ <i>b</i> ₁	+ 2.9 + 2.9 + 7.3 + 7.3	+ 28.2 — 36.5 — 33.8 — 69.3	+ 20.2 — 26.1 — 36.7 — 66.1	
ζ CYGNI.										
1881, October 25	M	4	1	6	0.204	<i>b</i> ₁	+ 11.8	+ 22.5	+ 30.7	
α CEPHEI.										
1881, September 7	M M	2 3	1 1	6 6	0.110 0.110	F F	— 2.8 — 2.8	— 59.8 — 24.7	— 47.3 — 39.0	
ζ PEGASI.										
1881, September 19	M M M	2 2 3	1 1 1	6 6 6	0.138 0.138 0.138	F F F	+ 3.8 + 3.8 + 3.8	+ 6.7 + 28.6 — 14.0	+ 8.4 + 25.6 — 16.0	
η PEGASI.										
1881, November 28	M M	1 1	1 1	6 6	0.161 0.161	<i>b</i> ₁ <i>b</i> ₁	+ 14.8 + 14.8	+ 13.3 — 14.8	+ 13.0 — 14.8	
α PISCIS AUSTRALIS (<i>Fomalhaut</i>).										
1881, September 19	M	1	1	6	0.138	F	+ 7.2	— 57.2	— 56.1	

Date.	Observer.	Weight.	Number of Half-Prisms.	Position Circle.	Width of Slit.	Line.	Earth's Motion in Miles per Second.	Concluded Motion of Star.		
								Measured.	Estimated.	
β PEGASI.										
1881, November	19	M	2	1	5	0'226	b ₁	+ 14'0	— 0'8	— 4'3
		M	2	1	5	0'226	b ₁	+ 14'0	— 8'2	— 4'3
		M	2	1	5	0'226	b ₁	+ 14'0	— 13'2	— 14'0
	22	M	1	1	5	0'188	b ₁	+ 14'4	— 69'4	— 75'7
		M	1	1	5	0'188	b ₁	+ 14'4	— 3'5	+ 0'2
		M	1	1	5	0'188	b ₁	+ 14'4	+ 44'5	+ 36'7
		M	1	1	5	0'188	b ₄	+ 14'4	+ 12'1	+ 21'1
		M	1	1	5	0'188	b ₄	+ 14'4	+ 0'8	+ 12'2
α PEGASI.										
1881, September	30	M	4	1	6	0'147	F	+ 4'8	— 30'1	— 29'8
		M	4	1	6	0'147	F	+ 4'8	— 44'0	— 34'8
December	3	M	2	1	6	0'200	F	+ 17'6	— 12'3	— 13'1
		M	4	1	6	0'200	F	+ 17'6	— 21'3	— 22'1
	7	M	5	1	6	0'187	F	+ 17'7	— 45'8	— 45'0
		M	5	1	6	0'187	F	+ 17'7	— 37'4	— 31'3
MOON.										
1881, March	14	M	..	1	95	0'208	F	..	+ 5'6	..
		M	..	1	95	0'208	F	..	— 13'6	..
		M	..	1	95	0'208	F	..	+ 3'1	..
		M	..	1	95	0'208	F	..	+ 1'2	..
		M	..	1	95	0'208	F	..	— 2'5	..
		M	..	1	95	0'208	F	..	— 1'2	..
		M	..	1	95	0'208	F	..	+ 3'1	..
April	6	WC	..	1	275	0'150	b ₁	..	— 11'7	..
		WC	..	1	275	0'150	b ₁	..	+ 23'0	..
		WC	..	1	275	0'150	b ₁	..	— 21'8	..
	7	M	..	2	275	0'170	b ₁	..	+ 0'3	..
		M	..	2	275	0'170	b ₂	..	— 1'3	..
		M	..	2	275	0'170	b ₄	..	— 0'6	..
	9	M	..	2	275	0'300	F	..	— 0'5	..
		M	..	2	275	0'300	F	..	— 0'5	..
		M	..	1	275	0'300	F	..	— 5'3	..
		M	..	1	275	0'300	F	..	+ 3'4	..
		M	..	1	275	0'300	F	..	+ 2'2	..
		M	..	1	275	0'300	F	..	+ 0'6	..
May	6	M	..	1	5	0'202	F	..	— 8'6	..
		M	..	1	5	0'202	F	..	+ 5'9	..
		M	..	1	5	0'202	F	..	— 4'6	..
	11	M	..	1	5	0'218	F	..	— 0'9	..
		M	..	1	5	0'218	F	..	— 4'9	..
		M	..	1	5	0'218	F	..	+ 8'0	..
		M	..	1	5	0'218	F	..	+ 3'4	..
		M	..	1	5	0'218	F	..	— 1'5	..
	13	M	..	1	5	0'180	F	..	+ 1'8	..
		M	..	1	5	0'180	F	..	— 1'2	..

56 COLLECTED RESULTS FOR MOTIONS OF STARS IN THE LINE OF SIGHT FROM SPECTROSCOPIC OBSERVATIONS

Date.	Observer.	Weight.	Number of Half-Prisms.	Position Circle.	Width of Slit.	Line.	Earth's Motion in Miles per Second.	Concluded Motion of Star.		
								Measured.	Estimated.	
MOON—continued.										
1881, November 28	M	..	1	6	0'161	b_1	..	—	0'4	..
	M	..	1	6	0'161	b_1	..	—	1'9	..
	M	..	1	6	0'161	b_1	..	+	1'6	..
	M	..	1	6	0'161	b_1	..	+	3'1	..
	M	..	1	6	0'161	b_1	..	—	5'9	..
December 3	M	..	1	6	0'200	F	..	—	3'4	..
	M	..	1	6	0'200	F	..	+	0'6	..
	M	..	1	6	0'200	F	..	+	0'3	..
	M	..	1	6	0'200	F	..	..	0'0	..
	M	..	1	6	0'200	F	..	—	9'9	..
7	M	..	1	6	0'181	F	..	+	6'2	..
	M	..	1	6	0'181	F	..	—	7'7	..
	M	..	1	6	0'181	F	..	—	6'2	..
	M	..	1	6	0'181	F	..	—	0'6	..
	M	..	1	6	0'181	F	..	+	2'2	..
SKY SPECTRUM.										
1881, February 28	M	..	1	95	0'110	F	..	+	19'1	..
	M	..	1	95	0'110	F	..	+	4'0	..
	M	..	1	95	0'110	F	..	+	30'2	..
	M	..	1	95	0'110	F	..	..	0'0	..
	M	..	1	95	0'110	F	..	+	2'5	..
March 26	M	..	1	275	0'232	b_1	..	+	3'5	..
	M	..	1	275	0'232	b_1	..	+	0'4	..
	M	..	1	275	0'232	b_1	..	+	0'8	..
	M	..	1	275	0'232	b_1	..	+	8'6	..
	M	..	1	275	0'232	b_1	..	—	3'9	..
29	M	..	1	275	0'232	b_1	..	—	7'4	..
	M	..	1	275	0'205	b_1	..	—	6'2	..
	M	..	1	275	0'205	b_1	..	+	7'8	..
	M	..	1	275	0'205	b_1	..	+	8'2	..
	M	..	1	275	0'205	b_1	..	—	10'5	..
April 1	M	..	1	275	0'205	b_1	..	+	3'9	..
	M	..	1	275	0'205	b_1	..	—	1'6	..
	M	..	1	275	0'180	b_1	..	—	7'4	..
	M	..	1	275	0'180	b_1	..	—	15'6	..
	M	..	1	275	0'180	b_1	..	—	2'3	..
17	M	..	1	275	0'180	b_1	..	+	4'7	..
	M	..	1	275	0'180	b_1	..	—	2'3	..
	M	..	1	5	0'142	F	..	—	1'5	..
	M	..	1	5	0'142	F	..	—	1'8	..
	M	..	1	5	0'142	F	..	+	2'8	..
May 5	M	..	1	5	0'142	F	..	—	10'5	..
	M	..	1	5	0'142	F	..	+	2'8	..
	M	..	1	5	0'162	F	..	—	5'6	..
	M	..	1	5	0'162	F	..	+	18'8	..
	M	..	1	5	0'162	F	..	—	6'5	..
	M	..	1	5	0'162	F	..	—	4'6	..
	M	..	1	5	0'162	F	..	..	0'0	..

Date.	Observer.	Weight.	Number of Half-Prisms.	Position Circle.	Width of Slit.	Line.	Earth's Motion in Miles per Second.	Concluded Motion of Star.			
								Measured.	Estimated.		
SKY SPECTRUM—continued.											
1881, June	23	M	..	1	275	0.094	b ₁	..	—	1.6	..
		M	..	1	275	0.094	b ₁	..	—	0.8	..
		M	..	1	275	0.094	b ₁	..	—	0.8	..
		M	..	2	275	0.094	b ₁	..	—	5.4	..
		M	..	2	275	0.094	b ₁	..	+	2.5	..
		M	..	2	275	0.094	b ₁	..	—	1.3	..
September	20	M	..	1	6	0.138	F	..	+	25.6	..
		M	..	1	6	0.138	F	..	—	2.8	..
		M	..	1	6	0.138	F	..	+	2.8	..
		M	..	1	6	0.138	F	..	—	4.6	..
		M	..	1	6	0.138	F	..	—	12.3	..
	30	M	..	1	6	0.147	F	..	+	4.9	..
		M	..	1	6	0.147	F	..	—	3.4	..
		M	..	1	6	0.147	F	..	—	3.4	..
		M	..	1	6	0.147	F	..	—	0.9	..
		M	..	1	6	0.147	F	..	—	1.8	..
October	19	M	..	1	6	0.239	b ₁	..	—	0.4	..
		M	..	1	6	0.239	b ₁	..	+	9.3	..
		M	..	1	6	0.239	b ₁	..	—	1.6	..
		M	..	1	6	0.239	b ₁	..	+	1.9	..
		M	..	1	6	0.239	b ₁	..	—	0.4	..
November	21	M	..	1	5	0.226	b ₁	..	—	3.1	..
		M	..	1	5	0.226	b ₁	..	—	1.6	..
		M	..	1	5	0.226	b ₁	..	+	1.9	..
		M	..	1	5	0.226	b ₁	..	—	3.5	..
		M	..	1	5	0.226	b ₁	..	+	4.3	..
	23	M	..	1	5	0.188	b ₁	..	+	6.2	..
		M	..	1	5	0.188	b ₁	..	—	1.9	..
		M	..	1	5	0.188	b ₁	..	+	0.4	..
		M	..	1	5	0.188	b ₁	..	—	6.6	..
		M	..	1	5	0.188	b ₁	..	+	1.9	..

OBSERVATIONS of the SPECTRA of an AURORA, of COMETS *b* and *c* 1881, and of the ECLIPSED MOON, made at the ROYAL OBSERVATORY, GREENWICH, in the YEAR 1881.

AURORA.

1881, January 31^d. 7^h. 0^m. to 8^h. 0^m.

Hand Spectroscope ("half-prism"). One-prism train.

Observer, M.

The most brilliant part of the auroral display was unfortunately over before observation could be commenced, and the rosy streamers seen for a short time in the N.W. had quite disappeared. The brightest portion of the green streamers had also faded, leaving little beside the main arch of green light, which was much duller than it had been earlier. The observations were therefore made exclusively on that portion of the display.

Only one bright line was seen; no continuous spectrum was visible. Both the eye-piece prism and a low power direct-vision spectroscope were tried, but with no advantage over the one used.

The auroral line as actually measured was wide, because the slit was wide, but appeared narrow and sharp with a narrow slit. But as the bright line for measuring with could only be seen with a wide slit,* the slit had to be opened far wider than was necessary simply to see the auroral line, which was very bright.

The following measures were obtained of the position of the auroral line as compared with that of the D lines given by a sodium flame, the wave-length being inferred by means of a curve formed from measures of lines in the solar spectrum between D and *b*.

	Auroral Line Centre.		D Lines Centre.		Wave-length of Auroral Line inferred.	
	r		r		tenth-metres.	
	0.312		0.858		5605	
	0.039		0.898		5472	

	Auroral Line.			D Lines.			Wave-length of Auroral Line inferred.
	Blue Edge.	Red Edge.	Inferred Reading for Centre.	Blue Edge.	Red Edge.	Inferred Reading for Centre.	
	r	r	r	r	r	r	
	0.280	0.306	0.293	0.918	0.976	0.947	5559
	.194	.226	.211	.880	.988	.934	5530
	.208	.338	.273	.880	.968	.924	5561
	.238	.340	.289	.876	1.032	.954	5555

Mean Wave-length of Auroral line.....5547 $\pm$ 11 tenth-metres.COMET *b* 1881 (TEBBUTT'S).1881, June 24^d. 8^h $\frac{1}{2}$. to 13^h $\frac{1}{2}$.

Half-prism Spectroscope. One "half-prism."

Observer, W C.

The spectrum from the nucleus and adjacent parts of the head appeared to be perfectly continuous, and only one band, in the green, was made out with certainty. This band was very distinct from one part of the head, but hardly traceable from any other part. Comparison with the second spectrum of carbon as given by alcohol vapour in a vacuum-tube showed that this band was situated at a distance of about 38 tenth-metres towards the blue from the carbon-band at 5197 tenth-metres.

* This bright line is an image of the slit formed by rays which pass through the spectroscope above and below the prism, forming a fixed line of reference in the field of view, with which the spectral line is brought into coincidence by turning the half-prism by means of a micrometer screw.

The following measures of the position of the less refrangible edge of the green band were obtained from comparisons with the carbon band at 5164.

	Band measured.	Wave-length.	Width of Slit.
		tenth-metres.	in. tenth-metres.
	Green band.....	5151.7*	.0288 = 62.1
	Green band.....	5159.8	.0288 = 62.1

* Measure rough.

1881, June 25^d. 9 $\frac{1}{2}$ ^h. to 14^h.

Half-prism Spectroscope. One "half-prism."

Observers, W C and M.

Three bands were now detected in the Comet's spectrum, though the great brilliancy of the continuous spectrum nearly overpowered them, and rendered their observation a matter of difficulty. As far as could be judged, these bands were not obtained from the nucleus, but from its immediate vicinity. A comparison with the spectrum of cyanogen given by a vacuum-tube showed no instances of coincidence, but each of the three bands was seen to be coincident with the corresponding band of the spectrum of a Bunsen-flame at 5164, 4736, and 4311 respectively. No band was detected in the yellow.

The following measures of the position of the less refrangible edge of the green band were obtained.

	Band measured.	Wave-length.	Width of Slit.
		tenth-metres.	in. tenth-metres.
	Green band.....	5167.9	.0045 = 9.7
	Green band.....	5159.0	.0045 = 9.7
	Green band.....	5161.5	.0045 = 9.7

1881, June 29^d. 10^h. to 14 $\frac{1}{2}$ ^h.

Half-prism Spectroscope. One "half-prism" reversed.

Observer, M.

The continuous spectrum was given from a much smaller area of the Comet than on the two former nights of observation, being only 15" to 18" in breadth, and seen only over the nucleus and its immediate neighbourhood. Several dark lines were perceived in it, between the green and blue bands, one of these lines being undoubtedly F, as is shown by the following measures of it as compared with the H β line from a vacuum-tube.

	Apparent Displacement.	Wave-length of Dark Line.	Width of Slit.
	tenth-metres.	tenth-metres.	in. tenth-metres.
	+ 0.18	4860.92	.0026 = 2.8
	- 0.32	4860.42	.0026 = 2.8

The δ lines could not be made out, but they would fall just within the bright edge of the green band.

Three bright bands were seen in the yellow, green, and blue respectively, the band in the violet not being detected. Each band was bright and fairly sharp towards the red, and became gradually fainter towards the blue. They were seen bright on the bright background of the continuous spectrum from the head, but could not be traced across the nucleus. The dark lines could not be detected in the spectrum of the nucleus, but this may have been due to its being so very narrow (2" or 3" in breadth).

The comparative brightness of the three bands was as follows :—

Yellow band..... 3 Edge not very sharp.
 Green band 10 Edge sharp and distinct.
 Blue band..... 1 Edge sharp.

The green band was obtained from the whole of the head, and from the tail to a distance of 12' from the nucleus.

The following measures of the positions of the bands were obtained from comparisons of the carbon-bands at 5633, 5164, and 4736.

Band measured.	Wave-length.	Width of Slit.	
	tenth-metres.	in.	tenth-metres.
Yellow band	5627.0	.0026	= 13.1
Yellow band	5639.5	.0026	= 13.1
Yellow band	5619.4	.0026	= 13.1
Green band	5159.9	.0026	= 9.6
Green band	5161.8	.0026	= 9.6
Green band	5160.9	.0026	= 9.6
Blue band	4728.2	.0026	= 6.2
Blue band	4730.2	.0026	= 6.2

Single-prism Spectroscope. Micrometer B.

The exact coincidence of the three Comet-bands with the three in the Bunsen-flame was noticed, the accord when the two spectra were seen side by side being as perfect in every way as the eye could judge. This spectroscope did not show the violet band, but the blue band appeared much brighter in comparison with the other two than with the "half-prism" spectroscope. It was estimated as brighter than the yellow band, and quite half as bright as the green.

No dark lines were distinguished in the continuous spectrum above the green band, but several strong lines were seen below it. Daylight came on before measures of these lines could be obtained, but rough estimations of their positions showed that two of the darkest were probably the E group and the strong double line at 5327. The D lines were not made out with certainty.

The following measures of the position of the less refrangible edge of the green band were obtained.

Band measured.	Wave-length.	Width of Slit.	
	tenth-metres.	in.	tenth-metres.
Green band	5161.5	.01245	= 26.1
Green band	5165.0	.01245	= 26.1

1881, July 2^d. 12^h.

Half-prism Spectroscope. One "half-prism" reversed.

Observer, M.

The continuous spectrum was faint, and no dark lines were detected in it. The green band of the Comet appeared to be perfectly coincident with the band from the Bunsen-flame. Clouds prevented further observation.

1881, July 4^d. 10^h. to 14^h.

Half-prism Spectroscope. One "half-prism" reversed.

Observer, M.

Three bands in the yellow, green, and blue were seen as usual, the first and last being very faint. No others were detected. The continuous spectrum was too narrow to show any dark lines.

The following measures of the positions of the less refrangible edge of the green band were obtained.

	Band measured.	Wave-length.	Width of Slit.	
		tenth-metres.	in.	tenth-metres.
	Green band	5165.3	0.1568	= 14.7
	Green band	5163.7	0.1568	= 14.7
	Green band	5158.1	0.0581	= 5.4
	Green band	5161.9	0.0581	= 5.4
	Green band	5165.0	0.0581	= 5.4

1881, July 6^d. 10^h. to 14^h.

Half-prism Spectroscope. One "half-prism" reversed.

Observer, M.

The continuous spectrum was more distinct than on July 4, but no dark lines could be detected.

With the spectra of the Comet and of the Bunsen-flame arranged one above the other, and the flame adjusted until the bright sharp edge of the green band was of the same intensity in each, the resemblance between the two spectra was exceedingly striking, the three principal bands corresponding exactly in position, in brightness, and in the manner and degree in which they shaded off towards the violet. The fourth band (that in the violet) was, however, far less distinct in the spectrum of the Comet than in that of the Bunsen-flame, indeed its presence in the former was only just suspected. Search was also made for a red band, and, with a very wide slit, an extremely faint light was just suspected somewhere in the red part of the spectrum, about midway between C and D.

The following measures of the positions of the less refrangible edges of the yellow, green, and blue bands were obtained.

	Band measured.	Wave-length.	Width of Slit.	
		tenth-metres.	in.	tenth-metres.
	Yellow band	5632.4	0.1322	= 16.8
	Yellow band	5629.5	0.1322	= 16.8
	Yellow band	5629.9	0.1322	= 16.8
	Yellow band	5635.0	0.1322	= 16.8
	Green band	5163.8	0.0380	= 3.6
	Green band	5164.0	0.0380	= 3.6
	Green band	5164.0	0.0380	= 3.6
	Green band	5164.3	0.0380	= 3.6
	Green band	5164.0	0.0380	= 3.6
	Green band	5165.3	0.0380	= 3.6
	Green band	5164.0	0.1322	= 12.4
	Green band	5163.7	0.1322	= 12.4
	Green band	5163.4	0.1322	= 12.4
	Green band	5165.2	0.1322	= 12.4
	Green band	5164.4	0.1322	= 12.4
	Blue band	4735.5	0.1322	= 7.9
	Blue band	4736.9	0.1322	= 7.9
	Blue band	4736.0	0.1322	= 7.9
	Blue band	4736.4	0.1322	= 7.9

Means of measures of less refrangible edges of the bands in the Comet's spectrum.

	Band measured.	Wave-length.	Carbon-band, Bunsen-flame.
		tenth-metres.	tenth-metres.
	Yellow band	5630.4 ± 1.6	5633.0
	Green band	5162.7 ± 0.4	5164.0
	Blue band	4733.9 ± 1.1	4736.0

COMET *c* 1881 (SCHÄBERLE'S).1881, August 4^d. 8 $\frac{1}{2}$ ^h. to 13 $\frac{1}{2}$ ^h.

Half-prism Spectroscope. One "half-prism" reversed.

Observer, M.

The Comet showed a spectrum consisting of three bright bands approximately coincident with the three brightest bands of the spectrum of the Bunsen-flame. Eventually a very faint continuous spectrum, due to the nucleus, was detected. The green band was the only one which had a sufficiently-defined edge to be measured. The yellow band appeared to be displaced towards the blue of the corresponding band of the flame spectrum by an unmistakeable amount, say about 8 tenth-metres. The blue band was too faint for anything to be observed concerning it, further than that it showed a rough coincidence with the band from the Bunsen-flame. The whole of the head of the Comet gave the spectrum of the bands.

The relative brightness of the bands appeared to be as follows:—

Yellow band..... 3

Green band..... 10

Blue band..... 1

The following measures were obtained of the position of the less refrangible edge of the green band. Of the blue band it was only ascertained that it seemed to be coincident with the band of the Bunsen-flame at 4736·0.

Band measured.	Wave-length.	Width of Slit.	
		in.	tenth-metres.
Green band.....	5162·8	·01900	= 15·6
Green band.....	5163·0	·01900	= 15·6
Green band.....	5163·3	·01900	= 15·6
Green band.....	5164·4	·01900	= 15·6
Green band.....	5165·7	·00670	= 6·3
Green band.....	5163·9	·00670	= 6·3
Green band.....	5162·8	·00670	= 6·3
Green band.....	5161·8	·00670	= 6·3
Green band.....	5164·3	·00670	= 6·3
Green band.....	5163·1	·00670	= 6·3

1881, August 6^d. 8 $\frac{1}{2}$ ^h. to 13^h.

Half-prism Spectroscope. One "half-prism" reversed.

Observer, M.

The Comet's spectrum showed no change since August 4, except that it now seemed very faint, owing to the brilliant moonlight. The nucleus still gave a faint continuous spectrum, traceable from about D to F, but the spectrum of the bands was many times as bright. The whole of the head of the Comet gave the green band, but it could not be detected over the tail. The blue band was seen, but was not measurable, and no new bands could be discerned in the red, orange, or violet. A narrow slit was employed on the green band, but it could not be resolved into lines.

The following measures of the positions of the less refrangible edges of the yellow and green bands were obtained.

Band measured.	Wave-length.	Width of Slit.	
		in.	tenth-metres.
Yellow band.....	5629·3	·02670	= 33·9
Yellow band.....	5636·3	·02670	= 33·9
Yellow band.....	5621·3	·02670	= 33·9
Yellow band.....	5633·9	·02670	= 33·9
Yellow band.....	5624·7	·02670	= 33·9
Green band.....	5162·6	·00682	= 6·4
Green band.....	5163·1	·00682	= 6·4
Green band.....	5163·3	·00682	= 6·4
Green band.....	5164·4	·00682	= 6·4
Green band.....	5164·5	·00682	= 6·4
Green band.....	5162·8	·00682	= 6·4
Green band.....	5164·0	·00682	= 6·4
Green band.....	5165·1	·00682	= 6·4
Green band.....	5163·4	·00682	= 6·4
Green band.....	5163·6	·00682	= 6·4

1881, August 19^d. 8^h. to 11^h $\frac{1}{2}$.

Half-prism Spectroscope. One "half-prism" reversed.

Observer, M.

The three bands were seen as on the two previous occasions, and with a very wide slit two others were suspected, the one as far below D as the yellow band is above it; that is to say, in the neighbourhood of 6100 tenth-metres; and the other just to the red of G or at wave-length $4310 \pm$. The continuous spectrum was now obtained not merely from the nucleus, but also from its immediate neighbourhood, and showed a total breadth of 7", and it was visible from the red band up to the band in the violet, but no dark lines could be detected in it. The band spectrum was, however, still many times as bright as the continuous spectrum from the nucleus, at the less refrangible edges of the principal bands. The green band was given by every part of the head, even the faintest, and was clearly obtained from the tail at a distance of quite 10' from the nucleus. A very narrow slit was used on the green band in order to detect any resolvability if possible. The band could not be broken up into lines, but a second edge was suspected at 5126.

Means of measures of the less refrangible edges of the bands in the Comet's spectrum—

	Band measured.	Wave-length.	Carbon-spectrum, Bunsen-flame.
		tenth-metres.	tenth-metres.
	Yellow band	5629.1 $\pm$ 2.1	5633.0
	Green band	5163.6 $\pm$ 0.15	5164.0

Thalén's wave-lengths for the less refrangible edges of the bands in the first and second spectra of carbon, from which the wave-lengths of the Comet-bands were inferred, were assumed throughout, as follows:—

	Band.	First Spectrum, Bunsen-flame.	Second Spectrum, Marsh Gas or Cyanogen.
		tenth-metres.	tenth-metres.
	Yellow band	5633.0	5607.5
	Green band	5164.0	5197.0
	Blue band	4736.0	4697.0

ECLIPSE OF MOON.

1881, December 5, 5^h. 40^m. to 6^h. 50^m.

Single-prism Spectroscope. Micrometer B.

Pos. Circle, 25°. Width of Slit, 0^m. 01.

Observer, M.

None of the markings were visible on the dark part of the Moon as examined with the 3-inch finder telescope, but the Moon's limb was clearly seen through the shadow. The spectrum of the part in shadow was much fainter than that of the part in the penumbra. The spectrum in shadow was traceable from about W. L. 6000+ to W. L. 4600+. The general spectrum was seen from C to G.

Only one dark band was clearly seen in the spectrum of the eclipsed part, other than the usual Fraunhofer lines. It was fairly distinct, nebulous at the edges, and somewhat condensed in the middle. The readings obtained for it gave the following wave-length values:—

tenth-metres.
5710
5690
5685
5704

It was obviously Band δ of the Brewster-Gladstone spectrum.

A single measure was obtained of another band, the presence of which was suspected between δ and D, which gave its wave-length as 5887 tenth-metres. The existence of this band is doubtful.

A third very faint band was suspected beyond δ to the blue, about W. L. 5550 ± 20 . It was probably Band ϵ of the Brewster-Gladstone spectrum.