PHOTO-HELIOGRAPHIC RESULTS
1874 TO 1885

BEING

SUPPLEMENTARY RESULTS

FROM

PHOTOGRAPHS OF THE SUN

TAKEN AT

GREENWICH, AT HARVARD COLLEGE, U.S.A., AT MELBOURNE, IN INDIA, AND IN MAURITIUS

IN THE YEARS

1874 TO 1885:

AND MEASURED AND REDUCED AT THE

ROYAL OBSERVATORY, GREENWICH,

UNDER THE DIRECTION OF

SIR W. H. M. CHRISTIE, K.C.B., M.A., D.Sc., F.R.S.,
ASTRONOMER-ROYAL.

(APPENDIX TO THE GREENWICH OBSERVATIONS, 1905.)

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TABLE OF CONTENTS.

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PHOTO-HELIOGRAPHIC RESULTS,

1874-1885.

INTRODUCTION.

THE purpose of the present volume is to supplement the "Measures of Positions and Areas of Spots and Faculæ upon Photographs of the Sun" for the years 1874 to 1885, as published in the volumes of the *Greenwich Observations* for the years 1877 to 1885, so as to render them uniform with the similiar results published for 1886 and the succeeding years. And this in two directions. First, by supplying as far as possible the gaps in the series of solar photographs taken at Greenwich; and next, by adding to the results of the measures of positions and areas of spots and faculæ as exhibited in calendar form the results of the measures in three other forms as well. These forms include; first, "ledgers," wherein the life history is given for each group of spots as shown in its position and area day by day; next, tables giving the total areas day by day of spots and faculæ, as "projected," that is, as seen uncorrected for foreshortening; and third, tables of the mean areas and mean latitude of spots for each synodic rotation of the Sun, and for each year. Such "spot ledgers" and tables were given for the year 1886, and subsequent years, and are now supplied for the years 1874 to 1885.

In the matter of supplying the days unrepresented in the series of photographs taken at Greenwich, the twelve years in question, 1874 to 1885, fall into three periods of four years each. For the first period, 1874 to 1877, a number of solar photographs taken at the Observatories of Harvard College, Cambridge, Mass., U.S.A., and of Melbourne, Australia, were placed by the Directors of those two Observatories in the hands of the Astronomer Royal, and have been measured and reduced at the Royal Observatory, Greenwich, and the results have been collated with the measures of the solar photographs taken at Greenwich for the same years. The first section of the present volume contains these combined results from the Greenwich, Harvard College, and Melbourne photographs for the four years, 1874 to 1877, exhibited as a daily register, *i.e.* in calendar form; the second section gives those results in the form of ledgers of the spot groups.

For the second period, 1878 to 1881, the Solar Physics Committee obtained a number of solar photographs taken at Dehra Dûn in India, and at Melbourne, besides a few taken in Mauritius, and these were measured and reduced at the Solar Physics Observatory, South Kensington, under the direction of Sir J. Norman Lockyer. The

results were collated with the measures of the Greenwich photographs for the same years, and were published by the Solar Physics Committee in calendar form, in 1892. The results for these four years exhibited in the form of ledgers of spot-groups form the third section of the present volume.

In the third period, 1882 to 1885, photographs taken at Dehra Dûn in India, necessary to fill the gaps in the Greenwich series, were sent to the Astronomer Royal by the Solar Physics Committee as required, and were measured and reduced at the Royal Observatory, Greenwich, together with the photographs taken at Greenwich; the results in calendar form being published in the volumes of *Greenwich Observations* for 1882 and the following years. In 1885 photographs were also supplied in like manner from the Royal Alfred Observatory, Mauritius, and were measured and reduced together with the Greenwich and Dehra Dûn negatives. The fourth section of the present volume gives the combined results for these four years, 1882 to 1885, in the form of ledgers of spot-groups. From the year 1886 the ledgers of spot groups have been given regularly in the annual volumes of *Greenwich Observations.*

The fifth section gives the daily total projected areas of spots and faculæ for the whole of the twelve years, 1874 to 1885, and the sixth, the mean areas and mean latitudes of spots for the same complete period.

§ 1. *Measures of Positions and Areas of Sun Spots and Faculæ on Photographs taken at Greenwich, at Harvard, and at Melbourne, with the deduced Heliographic Longitudes and Latitudes;* 1874–1877.

These measures are the republication, in a modified form, of the "*Measures of Positions and Areas of Spots and Faculæ*" printed on pages 105–151 of the volume of *Greenwich Observations* for 1877, supplemented by measures of photographs taken at the Observatories of Harvard College, Cambridge, Mass., U.S.A., and of Melbourne, Australia, and placed in the hands of the Astronomer Royal for the purpose of measurement and reduction by the Directors of those two Observatories, Professor Edward C. Pickering and Dr. Robert J. Ellery, F.R.S.

The Greenwich photographs were taken with the Kew Photoheliograph of 3·6 inches aperture up to 1875 September 17, and after that date with the Dallmeyer Photoheliograph of 4 inches aperture returned from the Transit of Venus Expedition to New Zealand. The Melbourne photographs were taken with an instrument of the same pattern and aperture as the Dallmeyer Photoheliograph; and the Harvard College photographs were taken in the primary focus of a "horizontal photoheliograph"; the sunlight being received upon a movable mirror from which it was reflected into a

stationary lens of 5 inches aperture and about 39 feet focal length. The mean diameter of the image of the sun with each of these different instruments was about 4 inches.

The results of the measures of photographs of the Sun given in this volume, begin with 1874 April 17, on which date the regular work of the Photoheliographic Department was commenced at the Royal Observatory, Greenwich. The following table gives, for each of the three contributing observatories, the number of days in each year for which photographs of the sun taken there have been used for measurement and subsequent reduction.

	1874. (From April 17.)	1875.	1876.	1877.
Greenwich	139	150	154	168
Harvard College	2	65	66	...
Melbourne	...	48	51	67
Days represented	141	263	271	235
Days without record	118	102	95	130
Total	259	365	366	365

The *first* column on each page in this, the first section of the following results, contains the Greenwich civil time at which each photograph was taken, expressed by the day of the year and decimals of a day, reckoning from Greenwich mean midnight, January 1d. 0h., and also by the day of the month (civil reckoning), which latter is placed opposite the total area of spots and faculæ for the day. In cases where two or more photographs taken on the same day have been measured, the mean of the several times has been given; the positions and areas of the several spots and faculæ as measured on the different photographs being similarly combined. The photographs taken at the Harvard College Observatory are distinguished by the letter H., those taken at the Melbourne Observatory by the letters Me.; when no distinguishing letter is inserted in this column, the photograph was taken at Greenwich.

The *second* column contains the initials of the two persons measuring the photograph; the initial on the left being that of the person who measured the photograph on the left of the centre of the measuring instrument, and that on the right being that of the person who measured on the right of the centre.

The following are the signatures of those persons who measured the photographs for the years 1874 to 1877:—

E. W. Maunder	M	F. J. Bell	JB
H. P. Hollis	H	A. E. Pilkington	EP
H. Appleyard	A	W. Russell	WR
W. Baker	B	S. J. Temple	ST

The *third* column gives the No. of the group, and the letter for the spot. The groups are numbered in order of their appearance.

The *next two* columns give the distance from the centre of the Sun in terms of the Sun's radius, and the position-angle from the Sun's axis, reckoned from the Sun's north pole in the direction *n, f, s, p.* The micrometer by which the measures of the photographs were made, and the processes of measurement and reduction are described in the Introductions to the annual volumes of the Greenwich Observations.

The *sixth* and *seventh* columns give the heliographic longitude and latitude of the spot; the inclination of the Sun's equator to the ecliptic being assumed to be 7° 15′, the longitude of the ascending node as 74°, the prime meridian of the Sun that which passed through the ascending node at mean noon 1854 January 1, and the period of rotation 25·38 days. The heliographic longitude and latitude of the centre of the Sun's disc at the time of the exposure of each photograph are also given (in brackets) in the *sixth* and *seventh* columns respectively. In the volume of *Greenwich Observations* for 1877 the longitudes, latitudes, and position-angles were expressed in degrees and minutes; in the present volume they are given in degrees and tenths of a degree. The *three last* columns give the areas of umbræ, whole spots and faculæ expressed in millionths of the Sun's visible hemisphere; the total areas for each day being given (in brackets) in the last line for that day. The individual spots in a group have not always been measured separately, but have often been combined into clusters of two or more spots close together, the position of the centre of gravity and the aggregate area of the cluster being given.

§ 2. *Ledgers of Areas and Positions of Groups of Sun Spots deduced from the measurement of the Solar photographs for each day in the years* 1874–1877.

In these ledgers the daily results for each group are collected together from the measures of the individual spots as printed in the previous section, and given in a condensed form. The *first* column gives, for each day on which the group was observed, the Greenwich civil time at which each photograph was taken, expressed by the day of the month (civil reckoning) and the decimals of a day reckoning from Greenwich mean midnight. The *second* and *third* columns give the sums for each day of the projected areas of all the umbræ and whole spots comprised in the group, the projected area being the area as it is measured upon the photograph, uncorrected for foreshortening, and expressed in millionths of the Sun's apparent disc. The *fourth* and *fifth* columns give the sums for each day of the areas of all the umbræ and whole spots comprised in the group, corrected for foreshortening, and expressed in millionths of the Sun's visible hemisphere. The *sixth* and *seventh* columns give the mean longitude and latitude of the group, found by multiplying the longitude and latitude of each separately measured component of the group by its area, and dividing the sum of the products by the sum

of the areas. The *last* column gives the mean longitude of the group from the central meridian, and is found by subtracting the longitude of the centre of the disc from the mean longitude of the group. In cases where no photograph has been available for measurement on a given day, the means have been taken of the areas and positions of the spot-groups as measured on the day immediately preceding and that immediately following the day for which the photograph is lacking. These interpolated values are enclosed in brackets, but have been used in taking the final means for each spot-group. These means of the areas of umbræ and whole spots and of the longitudes and latitudes of the spot-groups for the period of observation are given at the foot of the daily results.

§ 3. *Ledgers of Areas and Positions of Groups of Sun Spots deduced from the measurement of the Solar Photographs for each day in the years* 1878 *to* 1881.

This section contains ledgers of groups of sun spots similar in character and form to those given for the years 1874 to 1877 in the preceding section. The measures of Solar photographs here given in the form of ledgers were published in the form of a daily register, in the year 1892, by the Solar Physics Committee, under the title:— *Measures of Positions and Areas of Sun Spots and Faculæ on Photographs taken at Greenwich, Dehra Dûn, and Melbourne; with the deduced heliographic longitudes and latitudes,* 1878–1881.

The photographs taken at Greenwich during these four years were measured and reduced there under the direction of the Astronomer Royal, and the results were published in the annual volumes of the *Greenwich Observations* for the years 1878 to 1881, and also in the *Greenwich Spectroscopic and Photographic Results* extracted from those volumes of the *Greenwich Observations.* The photographs taken at Dehra Dûn and at Melbourne were measured and reduced at South Kensington, under the direction of the Solar Physics Committee, and were published in the year 1892 under the title quoted above, the Greenwich reductions (extracted from the volumes of *Greenwich Observations*) being interpolated for the sake of completeness. The position-angles, longitudes and latitudes given in the Greenwich results were at the same time altered from degrees and minutes to degrees and tenths of a degree.

Wherever two photographs were measured on any day, the means of the two photographs have been taken in the preparation of these ledgers, both as to the times of the photographs, and as to the areas and positions of the spots. An additional column has also been supplied to indicate the place where the photograph was taken. A photograph taken at Greenwich is indicated by the letter G, one taken at Dehra Dûn, in India, by the letter I., one taken at Melbourne, by the letters Me., and one taken in Mauritius, by the letters Ma.

The photographs taken in Mauritius were under the superintendence of the late Dr. C. Meldrum, Director of the Royal Alfred Observatory, Pamplemousses, Mauritius. The majority of these showed neither spots nor faculæ, being taken at a time of a pronounced minimum in the solar activity, and the absence of any features requiring measurement was recorded in the volume published by the Solar Physics Committee. But thirty-five photographs, taken at Mauritius and placed by Dr. Meldrum in the care of the Solar Physics Committee, showed spots or faculæ or both and fill up gaps on twenty-three days for which no other photographs are at present available. These photographs have now been measured at Greenwich, so far as the areas of the spots and faculæ are concerned; but as the photographs are not provided with wires, it was not possible to compute the heliographic co-ordinates of the spot-groups, which have therefore been simply interpolated from the results obtained on the days immediately preceding and following those on which the Mauritius photographs were taken. These interpolated values, like the values interpolated for days whereon no photograph is available, have been enclosed in brackets, but have been used in taking the final means for the spots-groups.

The following table gives the number of days in each of the four years for which photographs are available from each of the four Observatories, distinguishing in each case between the photographs actually measured, and those showing neither spots nor faculæ.

	1878.	1879.	1880.	1881.
Greenwich :—				
Photographs measured	51	62	150	168
No spots or faculæ	96	65	7	0
Dehra Dûn, India :—				
Photographs measured	41	23	146	170
No spots or faculæ	113	52	22	1
Melbourne, Victoria :—				
Photographs measured	4	11	16	9
No spots or faculæ	0	0	0	0
Mauritius :—				
Photographs measured	3	20	0	0
No spots or faculæ	39	85	0	0
Days represented	347	318	341	348
Days without record	18	47	25	17
Total	365	365	366	365

All the photographs included in this section were on a scale of about 4 inches to the Solar diameter.

§ 4. *Ledgers of Areas and Positions of Groups of Sun Spots deduced from the measurement of the Solar Photographs for each day in the years* 1882 *to* 1885.

This section contains ledgers of groups of sun spots precisely similar in character and form to those given for the years 1874 to 1877 in the second section, and to the ledgers for the year 1886 and the following years given in the annual volumes of *Greenwich Observations* for 1886 and subsequent years. The ledgers here given are derived from the Measures of Positions and Areas of Spots and Faculæ published in the annual volumes of *Greenwich Observations* for the years 1882 to 1885, and in the *Greenwich Spectroscopic and Photographic Results* extracted from them.

The photographs measured in this section were taken at Greenwich under the direction of the Astronomer Royal, at Dehra Dûn, North-West Provinces, India, under the direction of the Deputy Superintendent, Trigonometrical Survey of India, and at the Royal Alfred Observatory, Mauritius, under the direction of the late Dr. C. Meldrum. The following table gives the number of days for which each of the three observatories supplied photographs used for measurement in the four years 1882 to 1885.

	1882.	1883.	1884.	1885.
Greenwich	201	214	154	206
Dehra Dûn	142	126	161	128
Mauritius	...	...	...	25
Days represented	343	340	315	359
Days without record	22	25	51	6
Total	365	365	366	365

The photographs taken at Greenwich were on a scale of about 4 inches to the solar diameter up to 1884 April 2, and on a scale of nearly 8 inches from that date onwards; those taken at Dehra Dûn were on the 4-inch scale up to 1882 November 7, and from 1882 December 8 to 1883 May 20, after which date they were on the 8-inch scale; the photographs taken at Mauritius were on the 4-inch scale until the end of 1885 February, the 8-inch scale being adopted at the beginning of 1885 March.

§ 5. *Total Projected Areas of Sun Spots and Faculæ for each day from* 1874 *April* 17 *to* 1885 *December* 31.

This section requires no further explanation and supersedes for the years 1882 to 1885 the corresponding tables given on pp. *60* to *66* of the *Greenwich Observations*

for 1888, and of the *Results of the Spectroscopic and Photographic Observations* made at the Royal Observatory, Greenwich in the year 1888, extracted from that volume.

§ 6. *Mean Areas and Mean Heliographic Latitude of Sun Spots and Faculæ for each Rotation of the Sun from* 1874 *April* 27 *to* 1886 *January* 16 *and for each Year from* 1874 *to* 1885.

This section corresponds to the tables printed on pp. *106* to *112* of the *Greenwich Observations* for 1884, on pp. *103* and *104* of the *Greenwich Observations* for 1885, and on pp. *67* and *68* of the *Greenwich Observations* for 1888, and on the same pages of the *Greenwich Spectroscopic and Photographic Results* extracted from those three volumes. The figures given in this section, being based upon the measures of a more complete series of photographs than those given in the corresponding tables published in the volumes for 1884, 1885 and 1888, naturally supersede them.

The measurement of the photographs and the preparation of the tabular results contained in the present publication have been carried out under the immediate superintendence of Mr Edward Walter Maunder, Superintendent of the Photo-heliographic Branch.

W. H. M. CHRISTIE.

Royal Observatory, Greenwich,
1907 *July* 20.

ERRATA AND ADDITIONS.

GREENWICH OBSERVATIONS 1877.

Measures of Positions and Areas of Spots and Faculæ.

PAGE.	COL.	LINE.	
108	1	5	Mean Solar Time, *for* 154·692, *read* 154·962.
109	1	34	Area of Umbra, *for* 20, *read* 77.
			Area of Whole Spot, *for* 351, *read* 620.
		35	Area of Umbra, *for* 90, *read* 23.
			Area of Whole Spot, *for* 717, *read* 405.
		37	Total Area of Umbræ, *for* 130, *read* 120.
			Total Area of Whole Spots, *for* 1767, *read* 1724.
114	1	29	Area of Umbra, *for* 110, *read* 89.
			Area of Whole Spot, *for* 641, *read* 522.
		31	Area of Whole Spot, *for* 60, *read* 73.
		33	Total Area of Umbræ, *for* 110, *read* 89.
			Total Area of Whole Spots, *for* 701, *read* 595.
		34	Area of Whole Spot, *for* 237, *read* 193.
		35	Area of Whole Spot, *for* 53, *read* 65.
		36	Total Area of Whole Spots, *for* 290, *read* 258.
117	1	12	Area of Whole Spot, *for* 13, *read* 26.
		14	Total Area of Whole Spots, *for* 100, *read* 113.
119	2	12	Mean Solar Time, *for* 31·960, *read* 30·960.
		14	Longitude, *for* 182° 52′, *read* 196° 2′.
		15	Mean Solar Time, *for* Feb. 2, *read* Feb. 1.
		16	Mean Solar Time, *for* 31·975, *read* 30·975.
		18	Longitude, *for* 183° 8′, *read* 196° 18′.
		19	Mean Solar Time, *for* Feb. 2, *read* Feb. 1.
121	1	24	Area of Umbra, *for* 101, *read* 63.
			Area of Whole Spot, *for* 597, *read* 376.
		28	Total Area of Umbræ, *for* 101, *read* 63.
		28	Total Area of Whole Spots, *for* 641, *read* 420.
		29	Area of Umbra, *for* 81. *read* 51.
			Area of Whole Spot, *for* 451, *read* 284.
		33	Total Area of Umbræ, *for* 81, *read* 51.
			Total Area of Whole Spots, *for* 478, *read* 311.
	2	29	No. of Group, *for* 153*, *read* 153†.
		37	Area of Whole Spot, *for* 54, *read* 79.
		38	Area of Umbra, *for* 34, *read* 32.
			Area of Whole Spot, *for* 110, *read* 105.
		39	Area of Umbra, *for* 93, *read* 80.
			Area of Whole Spot, *for* 494, *read* 429.
		40	Total Area of Umbræ, *for* 127, *read* 112.
			Total Area of Whole Spots, *for* 658, *read* 613.
122	2	26	Area of Umbra, *for* 155, *read* 127.
			Area of Whole Spot, *for* 951, *read* 773.
		27	Total Area of Umbræ, *for* 183, *read* 155.
			Total Area of Whole Spots, *for* 1129, *read* 951.
124	2	26	Mean Solar Time, *for* 182·918, *read* 181·918.
			Position Angle, *for* 148° 14′, *read* 148° 30′.

GREENWICH OBSERVATIONS, 1877—*continued.*

PAGE.	COL.	LINE.	
124	2	26	Longitude, *for* 49° 57′, *read* 63° 18′.
		27	Position Angle, *for* 281° 33′, *read* 282° 0′.
			Longitude, *for* 125° 13′, *read* 138° 30′.
			Latitude, *for* +11° 55′, *read* +12° 18′.
		28	Mean Solar Time, *for* July 3, *read* July 2.
		29	Mean Solar Time, *for* 182·934, *read* 181·934.
			Position Angle, *for* 148° 21′, *read* 148° 48′.
			Longitude, *for* 49° 52′, *read* 63° 6′.
			Latitude, *for* −9° 23′, *read* −9° 10′.
		30	Position Angle, *for* 281° 23′, *read* 281° 54′.
			Longitude, *for* 125° 11′, *read* 138° 24′.
			Latitude, *for* +11° 46′, *read* +12° 18′.
		31	Mean Solar Time, *for* July 3, *read* July 2.
		32	Mean Solar Time, *for* 185·885, *read* 184·885.
			Position Angle, *for* 247° 9′, *read* 247° 42′.
			Longitude, *for* 49° 35′, *read* 63° 0′.
			Latitude, *for* −9° 16′, *read* −9° 6′.
		33	Mean Solar Time, *for* July 6, *read* July 5.
		34	Mean Solar Time, *for* 185·901, *read* 184·901.
			Position Angle, *for* 247° 33′, *read* 248° 6′.
			Longitude, *for* 49° 50′, *read* 63° 12′.
			Latitude, *for* −9° 12′, *read* −9° 0′.
		35	Mean Solar Time, *for* July 6, *read* July 5.
125	1	2	Mean Solar Time, *for* 186·902, *read* 185·902.
			Position Angle, *for* 253° 27′, *read* 253° 54′.
			Longitude, *for* 49° 35′, *read* 63° 0′.
			Latitude, *for* −9° 13′, *read* 8° 54′.
		3	Mean Solar Time, *for* July 7, *read* July 6.
		4	Mean Solar Time, *for* 186·955, *read* 185·955.
			Position Angle, *for* 253° 4′, *read* 253° 30′.
			Longitude, *for* 49° 44′, *read* 63° 0′.
			Latitude, *for* −9° 42′, *read* −9° 24′.
		5	Mean Solar Time, *for* July 7, *read* July 6.
135	1	37	Mean Solar Time, *for* April 31, *read* May 1.
137	1	33	Latitude, *for* +7° 26′, *read* −7° 26′.
	2	11	Mean Solar Time, *for* July 23, *read* July 22.
139	First Note to 20.		Line 2. *For* May 5, 16, 18 to 21, *read* May 5, 18

Mean Areas of Umbræ, Whole Spots, and Faculæ, for each Rotation of the Sun, and for each Year, from 1873 July 11, to the end of 1877. Pages 149, 150 and 151.

This Section is superseded by the corresponding Tables on pages 314–317 of the present Volume.

GREENWICH OBSERVATIONS, 1878.

MEASURES OF POSITIONS AND AREAS OF SPOTS AND FACULÆ.

PAGE.	COL.	LINE.	
36	1	37–39	The second photograph taken on 1878 March 5 has not been used for the Ledger of Groups of Sun Spots.
	2	9–10	No. of Group. *Transpose* 271*b* *and* 271*c*.
		22	No. of Group, *for* 272*a*, *read* 272*b*.
		23	No. of Group, *for* 272*c*, *read* 272*a*.
		26	No. of Group, *for* 272*a*, *read* 272*b*.
		27	No. of Group, *for* 272*c*, *read* 272*a*.

MEAN AREAS OF UMBRÆ, WHOLE SPOTS AND FACULÆ, FOR EACH ROTATION OF THE SUN IN THE YEAR 1878, AND FOR THE YEAR. Page *39*.

This Section is superseded by the corresponding Tables on pages 314–317 of the present Volume.

GREENWICH OBSERVATIONS, 1879.

MEASURES OF POSITIONS AND AREAS OF SPOTS AND FACULÆ.

23	1	37	*Diminish* all longitudes from November 12 to December 2 inclusive, by 1° 25′.
to			
24	1	8	

MEAN AREAS OF UMBRÆ, WHOLE SPOTS AND FACULÆ, FOR EACH ROTATION OF THE SUN IN THE YEAR 1879, AND FOR THE YEAR. Page *25*.

MEAN HELIOGRAPHIC LATITUDE OF THE SPOTS UPON THE SUN'S DISC, FOR EACH ROTATION OF THE SUN, AND FOR EACH YEAR, FROM 1874 APRIL 16, TO 1879 DECEMBER 27. Pages *26* to *28*.

These two Sections are superseded by the corresponding Tables on pages 314–321 of the present Volume.

GREENWICH OBSERVATIONS, 1880.

MEASURES OF POSITIONS AND AREAS OF SPOTS AND FACULÆ.

PAGE.	COL.	LINE.	
67	1	26–28	The second photograph taken on 1880 March 19 has not been used for the Ledger of Groups of Sun Spots.
68	1	12	Distance, *for* 0·859, *read* 0·864.
			Longitude, *for* 174° 25′, *read* 174° 52′.
			Latitude, *for* +19° 4′, *read* +19° 32′.
		13	Distance, *for* 0·859, *read* 0·854.
			Longitude, *for* 174° 25′, *read* 173° 58′.
			Latitude, *for* +19° 2′, *read* +18° 35′.
		17	Distance, *for* 0·867, *read* 0·872.
			Longitude, *for* 174° 47′, *read* 175° 16′.
			Latitude, *for* +18° 55′, *read* +19° 22′.
		18	Distance, *for* 0·867, *read* 0·862.

GREENWICH OBSERVATIONS, 1880—*continued*.

PAGE.	COL.	LINE.	
68	1	18	Longitude, *for* 174° 46′, *read* 174° 15′.
			Latitude, *for* +18° 59′, *read* +18° 32′.
72	1	9	Mean Solar Time, *for* 153·074, *read* 153·116.
		10–14	*Diminish* all longitudes on June 2 by 0° 35′.
		20	Distance, *for* 0·388, *read* 0·407.
			Position Angle, *for* 349° 45′, *read* 4 6′.
			Longitude, *for* 89° 58′, *read* 83° 54′.
			Latitude, *for* +22° 23′, *read* +23° 48′.
			Area of Whole Spot, *for* 19, *read* 14.
		21	Total Area of Whole Spots, *for* 77, *read* 72.
		43–44	Area of Umbra, *Transpose* 89 *and* 9.
			Area of Whole Spot, *Transpose* 345 *and* 12.
73	2	31	Longitude, *for* 51° 10′, *read* 62° 39′.
			Latitude, *for* −33° 55′, *read* −38° 36′.
75	2	43	Area of Whole Spot, *for* 690, *read* 69.
76	1	12	Total Area of Whole Spots, *for* 1625, *read* 1004.
77	1	29	*Increase* all longitudes on September 13 by 1°·0.
to			
	2	5	
78	2	35	Latitude, *for* −29° 10′, *read* −20° 10′.

MEAN AREAS OF UMBRÆ, WHOLE SPOTS AND FACULÆ, FOR EACH ROTATION OF THE SUN, IN THE YEAR 1880, AND FOR THE YEAR. Page *83*.

MEAN HELIOGRAPHIC LATITUDE OF THE SPOTS UPON THE SUN'S DISC FOR EACH ROTATION OF THE SUN, IN THE YEAR 1880, AND FOR THE YEAR. Page *84*.

These two Sections are superseded by the Tables on pages 314–321 of the present Volume.

GREENWICH OBSERVATIONS, 1881.

MEASURES OF POSITIONS AND AREAS OF SPOTS AND FACULÆ.

Page 66, Column 1, after line 28. *Insert* as follows :—

		410*b*	0·697	64° 36′	237° 30′	+13° 18′	0	21
		410*b*	0·734	64 18	234 36	+14 36	0	17

66	1	30	Total Area of Whole Spots, *for* 730, *read* 768.
	2	37	No. of Group, *for* 417, *read* 418.
67	2	15	Distance, *for* 0·795, *read* 0·747.
			Longitude, *for* 260° 2′, *read* 264° 31′.
			Latitude, *for* −17° 29′, *read* −17° 6′.
68	1	2	Mean Solar Time, *for* 74·695, *read* 74·965.
	2	7	Longitude, *for* 223° 22′, *read* 225° 18′.
		9	Longitude, *for* 170° 3′, *read* 169° 53′
			Latitude, *for* +11° 2′, *read* +12° 54′.
71	2	13–18	*Diminish* all longitudes by 1° 0′.
74	1	28	Distance, *for* 0·632, *read* 0·684.
			Longitude, *for* 312° 44′, *read* 308° 45′.
			Latitude, *for* +12° 24′, *read* +13° 7′.
			Area of Whole Spot, *for* 70, *read* 75.
		35	Total Area of Whole Spots, *for* 1396, *read* 1401.

GREENWICH OBSERVATIONS, 1881—*continued.*

PAGE.	COL.	LINE.	
80	1	31–32	No. of Group, *transpose* 553 *and* 552.
	2	35	Distance, *for* 0·562, *read* 0·536.
			Longitude, *for* 19° 42′, *read* 21° 30′.
			Latitude, *for* +20° 10′, *read* +19° 36′.
83	1	3	Longitude, *for* 41° 22′, *read* 40° 22′.
84	1	7	Mean Solar Time, *for* 311·928, *read* 311·975.
		8–14	*Diminish* all longitudes by 0° 40′
	2	11	Area of Whole Spot, *for* 16, *read* 6.
		18	Total Area of Whole Spots, *for* 1742, *read* 1732.
		25	Distance, *for* 0·581, *read* 0·530.
			Longitude, *for* 248° 8′, *read* 251° 14′.
			Latitude, *for* +24° 54′, *read* +22° 51′.
86	1	36	Distance, *for* 0·477, *read* 0·426.
			Longitude, *for* 28° 22′, *read* 28° 8′.
			Latitude, *for* +28° 14′, *read* +24° 59.

MEAN AREAS OF UMBRÆ, WHOLE SPOTS, AND FACULÆ, FOR EACH ROTATION OF THE SUN, IN THE YEAR 1881, AND FOR THE YEAR. Page *88.*

MEAN HELIOGRAPHIC LATITUDE OF THE SPOTS UPON THE SUN'S DISC FOR EACH ROTATION OF THE SUN, IN THE YEAR 1881, AND FOR THE YEAR. Page *89.*

These two Sections are superseded by the Tables on pages 314–321 of the present Volume.

GREENWICH OBSERVATIONS, 1882.

INTRODUCTION.

lxxxii		9	*For* on 221 days, *read* on 201 days.

MEASURES OF POSITIONS AND AREAS OF SPOTS AND FACULÆ.

42	1	27	Area of Whole Spot, *for* 78, *read* 8.
		34	Total Area of Whole Spots, *for* 344, *read* 274.
43	1	31	Longitude, *for* 17°·2, *read* 18°·2.
44	1	31	Area of Whole Spot, *for* 186, *read* 18.
		39	Total Area of Whole Spots, *for* 817, *read* 649.
	2	22	Longitude, *for* 241°·8, *read* 241°·6.
45	1	46	No. of Group, *for* 666, *read* 668.
			Distance, *for* 0·845, *read* 0·541.
			Longitude, *for* 262°·6, *read* 239°·1.
			Latitude, *for* +17°·4, *read* +7°·5.
			Area of Umbra, *for* 35, *read* 22.
			Area of Whole Spot, *for* 199, *read* 127.
			Area of Faculæ, *dele* 333*n*.
	2	2	Area of Faculæ, *insert* 333*n*.
		14	Total Area of Umbræ, *for* 269, *read* 256.
			Total Area of Whole Spots, *for* 1856, *read* 1784.

GREENWICH OBSERVATIONS, 1882—*continued.*

PAGE.	COL.	LINE.	
45	1	22	Area of Whole Spot, *for* 144, *read* 14.
		36	Total Area of Whole Spots, *for* 1042, *read* 912.
46	1	28	Longitude, *for* 159·3, *read* 158·9.
49	2	22	Total Area of Whole Spots, *for* 844, *read* 845.
51	1	33	Area of Umbra, *for* 18, *read* 32.
		34	Longitude, *for* 21°·0, *read* 21°·9.
		35	Longitude, *for* 2°·6, *read* 3°·5.
		36	Longitude, *for* 359°·4, *read* 0°·3.
		38	Longitude, *for* 267°·7, *read* 268°·6.
		40	Total Area of Umbræ, *for* 80, *read* 94.
	2	5	Area of Whole Spot, *for* 34, *read* 3.
		9	Total Area of Whole Spots, *for* 742, *read* 711.
	Footnote.		Group 711. *Omit*, It is not seen on March 28 and 29, but appears again on March 30.
53	2	8	Total Area of Umbræ, *for* 248, *read* 247.
		23	Area of Whole Spot, *for* 79, *read* 8.
		33	Total Area of Whole Spots, *for* 2208, *read* 2137.
55	2	4	Area of Umbra, *for* 271, *read* 162.
		6–10	Groups 733 to 738. *Diminish* all longitudes by 0°·4.
		12	Total Area of Umbræ, *for* 533, *read* 424.
		18	Area of Whole Spot, *for* 49, *read* 5.
		28	Total Area of Whole Spots, *for* 3376, *read* 3332.
59	2	6	Longitude, *for* 20°·0, *read* 20°·1.
			Latitude, *for* −13°·0, *read* −16°·5.
60	2	2	Longitude, *for* 332°·6, *read* 277°·3.
63	1	13	No. of Group, *for* 789, *read* 787.
64	2	8	Area of Whole Spot, *for* 316, *read* 32.
		12	Total Area of Whole Spots, *for* 397, *read* 113.
68	2	26	Area of Whole Spot, *for* 166, *read* 17.
		32	Total Area of Whole Spots, *for* 491, *read* 342.
72	2	4	Area of Umbra, *for* 97, *read* 36.
		9	Total Area of Umbræ, *for* 119, *read* 58.
75	1	18	Longitude, *for* 286°·7, *read* 286°·4.
			Latitude, *for* +5°·7, *read* +8°·1.
76	2	36–46	Oct. 20. *Increase* all longitudes on this day by 1°·0.
77	1	2– 6	
		16	No. of Group, *for* 859, *read* 862.
			Longitude, *for* 197°·9, *read* 167°·8.
83	2	31	Area of Whole Spot, *for* 30, *read* 301.
		43	Total Area of Whole Spots, *for* 817, *read* 1088.
85	1	30	Total Area of Umbræ, *for* 93, *read* 94.
87	2	35	Total Area of Whole Spots, *for* 1146, *read* 1147.

MEAN AREAS OF UMBRÆ, WHOLE SPOTS AND FACULÆ, FOR EACH ROTATION OF THE SUN, FROM 1881 DECEMBER 8 TO 1883 JANUARY 18, AND FOR THE YEAR 1882. Page *88.*

MEAN HELIOGRAPHIC LATITUDE OF THE SPOTS UPON THE SUN'S DISC FOR EACH ROTATION OF THE SUN, FROM 1881 DECEMBER 8 TO 1883 JANUARY 18, AND FOR THE YEAR 1882. Page *89.*

These two Sections are superseded by the Tables on pages 314–321 of the present Volume.

GREENWICH OBSERVATIONS, 1883.

MEASURES OF POSITIONS AND AREAS OF SPOTS AND FACULÆ.

PAGE.	COL.	LINE.	
73	2	15	Area of Whole Spot, *for* 224, *read* 22.
		18	Longitude, *for* 187°·7, *read* 197°·7.
		23	Total Area of Whole Spots, *for* 1110, *read* 908.
74	2	7	Total Area of Umbræ, *for* 152, *read* 142.
75	2	19	Latitude, *for* +11°·0, *read* +11°·4.
		20	Longitude, *for* 266°·9, *read* 266°·7.
Footnote.			*For* Jan. 29–Feb. 1, *read* Jan. 28–Feb. 1.
78	2	22	Area of Whole Spot, *for* 17, *read* 169.
		32	Total Area of Whole Spots, *for* 641, *read* 793.
81	1	26–30	Mar. 18. *Increase* all longitudes by 0°·9.
85	2	34	Mean Solar Time. *Insert* Apr. 21.
89	Footnote.		*For* June 2–9, *read* June 2–10.
91	1	22	No. of Group, *for* 1043, *read* 1045.
	2	5	Total Area of Umbræ, *for* 1, *read* 19.
		21	Total Area of Faculæ, *for* 84, *read* 684.
95	1	37	Mean Solar Time, *for* 189·084, *read* 189·894.
Footnote.			*For* July 14–16, *read* July 13–16.
97	2	21	Total Area of Umbræ, *for* 314, *read* 311.
99	1	34	Area of Umbra, *for* 22, *read* 12.
		36	Total Area of Umbræ, *for* 73, *read* 63.
	2	32	Total Area of Umbræ, *for* 548, *read* 558.
102	2	46	Latitude, *for* −11°·8, *read* +11°·8.
104	Footnote.		Group 1130, *for* Oct. 2–13, *read* Oct. 2–14.
105	1	8	Mean Solar Time, *for* 277·795, *read* 278·644.
Footnote.			*Insert* Group 1140, Oct. 9–18. A regular spot.
107	Footnote.		*Insert* Oct. 14. Some of the groups on this day were measured on an Indian photograph, 285·644.
108	1	20	Longitude, *for* 127°·1, *read* 128°·0.
		24	Area of Faculæ, *for* 1860*c*, *read* 4860*c*.
		27–34	Groups 1140–1147, *increase* all longitudes by 0°·9
		37	Total Area of Faculæ, *for* 6353, *read* 9353.
110	1	23	Area of Umbra, *for* 1, *read* 4.
		24	Total Area of Umbræ, *for* 206, *read* 209.
112	1	32	Mean Solar Time, *for* 306·791, *read* 306·707.
	2	15	Distance, *dele* 0·840.
			Position Angle, *dele* 283°·7.
113	1	34	Area of Whole Spot, *for* 8, *read* 2.
		47	Total Area of Whole Spots, *for* 602, *read* 596.
	2	6	Area of Umbra, *for* 1, *read* 2.
		15	Total Area of Umbræ, for 151, *read* 152.
116	1	26	Area of Spot, *for* 86, *read* 9.
		31	Total Area of Whole Spots, *for* 2786, *read* 2709.
	2	4	Area of Umbra, *for* 33, *read* 3.
		14	Total Area of Umbræ, *for* 303, *read* 273.
118	1	4	Longitude, *for* 105°·7, *read* 105°·6.
119	Footnote.		Group 1204, *for* Dec. 10–20, *read* Dec. 10–21.
120	1	18	Longitude, *for* 354°·3, *read* 353°·7.
		42	Total Area of Whole Spots, *for* 736, *read* 737.
	2	9	Total Area of Whole Spots, *for* 760, *read* 762.
121	2	21	Longitude, *for* 212°·7, *read* 211°·7.
		28	No. of Group, *insert* 1204.
122	1	48	Area of Umbra, *for* 24, *read* 11.
			Area of Whole Spot, *for* 191, *read* 86.
	2	8	Total Area of Umbræ, *for* 410, *read* 397.
			Total Area of Whole Spots, *for* 3258, *read* 3153.

GREENWICH OBSERVATIONS, 1883—*continued.*

PAGE.	COL.	LINE.	
123	2	14	Area of Whole Spot, *for* 114, *read* 11.
		39	Total Area of Whole Spots, *for* 2022, *read* 1919.

MEAN AREAS OF UMBRÆ, WHOLE SPOTS, AND FACULÆ, FOR EACH ROTATION OF THE SUN FROM 1882 DECEMBER 23 TO 1884 JANUARY 8, AND FOR THE YEAR 1883. Page *125*.

MEAN HELIOGRAPHIC LATITUDE OF THE SPOTS UPON THE SUN'S DISC FOR EACH ROTATION OF THE SUN, FROM 1882 DECEMBER 23, TO 1884 JANUARY 8, AND FOR THE YEAR 1883. Page *126*.

These two Sections are superseded by the Tables on pages 314–321 of the present Volume.

GREENWICH OBSERVATIONS, 1884.

MEASURES OF POSITIONS AND AREAS OF SPOTS AND FACULÆ.

41	1	30	Area of Umbra, *for* 10, *read* 0.
		37	Total Area of Umbræ, *for* 63, *read* 53.
	2	5	Longitude, *for* 140°·9, *read* 137°·9.
53	Footnote.		Group 1293, *for* Feb. 22–27, *read* Feb. 21–27.
54	1	8–10	No. of Group, *for* 1298, *read* 1299.
		21	Area of Faculæ, *for* 7986*c*, *read* 799*c*.
		25	Total Area of Faculæ, *for* 10244, *read* 3057.
58	1	6	Total Area of Whole Spots, *for* 1759, *read* 1758.
	2	33	Area of Umbra, *for* 2, *read* 0.
59	1	4	Total Area of Umbræ, *for* 233, *read* 231.
62	1	4	Area of Umbra, *for* 20, *read* 10.
		16	Total Area of Umbræ, *for* 181, *read* 171.
72	1	6–19	No. of Group. *Lower* all these numbers for May 29 two lines each.
	2	39 2	Mean Solar Time, *for* 148·655, *read* 150·659.
74	1	5	Area of Umbra, *for* 5, *read* 10.
		7	Total Area of Umbræ, *for* 52, *read* 57.
		24	Area of Umbra, *for* 10, *read* 13.
		28	Total Area of Umbræ, *for* 54, *read* 57.
76	2	33	Area of Whole Spot, *for* 9, *read* 1.
		41	Total Area of Whole Spots, *for* 555, *read* 547.
77	1 2	33 2	Mean Solar Time, *for* 199·709, *read* 199·909.
82	1	27	Longitude, *for* 224°·9, *read* 225°·0.
			Latitude, *for* −7°·1, *read* −7°·0.
	2	10	Longitude, *for* 222°·0, *read* 222°·2.
97	2	3	Area of Whole Spot, *for* 194, *read* 225.
		17	Total Area of Whole Spots, *for* 679, *read* 710.
100	2	26	Area of Umbra, *for* 37, *read* 4.
		33	Total Area of Umbræ, *for* 162, *read* 129.
102	2	2	Mean Solar Time, *for* 346·148, *read* 346·748.

GREENWICH OBSERVATIONS, 1884—*continued.*

PAGE.	COL.	LINE.	
102	2	5	Total Area of Umbræ, *for* 69, *read* 70.
		12	Longitude, *for* 218°·4, *read* 215°·5.
			Latitude, *for* —12°·7, *read* —12°·9.

MEAN AREAS OF UMBRÆ, WHOLE SPOTS AND FACULÆ FOR EACH SYNODIC ROTATION OF THE SUN, FROM 1873 JULY 28. Pages *106* to *108*.

MEAN HELIOGRAPHIC LATITUDE OF THE SPOTS UPON THE SUN'S DISC, FOR EACH SYNODIC ROTATION OF THE SUN FROM 1874 APRIL 27 TO 1884 DECEMBER 30. Pages *109* to *111*.

MEAN AREAS OF UMBRÆ, WHOLE SPOTS AND FACULÆ, FOR EACH YEAR FROM 1873 TO 1884. Page *112*.

MEAN HELIOGRAPHIC LATITUDE OF SPOTS UPON THE SUN'S DISC, FOR EACH YEAR FROM 1874 TO 1884. Page *112*.

These four Sections are superseded by the corresponding Tables on pages 314–321 of the present Volume.

GREENWICH OBSERVATIONS, 1885.

MEASURES OF POSITIONS AND AREAS OF SPOTS AND FACULÆ.

34	*2*	14	Area for Faculæ, *for* 14, *read* 141.
		15	Area for Faculæ, *for* 68, *read* 677.
		17	Total Area of Faculæ, *for* 1245, *read* 1981.
35	*1*	26	Area of Whole Spot, *for* 9, *read* 19.
		28	Total Area of Whole Spots, *for* 57, *read* 67.
	2	35	Longitude, *for* 169°·5, *read* 169°·6.
41	*1*	9	Longitude, *for* 248°·6, *read* 248°·7.
		10	Longitude, *for* 246°·1, *read* 246°·2.
		11	Longitude, *for* 244°·1, *read* 246°·2.
42	*1*	10	Area of Whole Spot, *for* 92, *read* 9.
		21	Total Area of Whole Spots, *for* 1332, *read* 1197.
43	1	18	Area of Umbra, *for* 6, *read* 1.
		35	Total Area of Umbræ, *for* 190, *read* 185.
	2	18	Total Area of Whole Spots, *for* 1386, *read* 1378.
		35	Total Area of Whole Spots, *for* 1150, *read* 1158.
47	2	12	Area of Whole Spot, *for* 96, *read* 10.
		15	Total Area of Whole Spots, *for* 2012, *read* 1926.
48	1	7	Distance, *for* 0·935, *read* 9·931.
		11	Distance, *for* 0·841, *read* 0·836.
		12	Distance, *for* 0·833, *read* 0·828.
52	2	2	Longitude, *for* 244°·4, *read* 243°·6.
		3	Longitude, *for* 240°·5, *read* 239°·7.
		4	Longitude, *for* 235°·7, *read* 236°·4.

PHOTO-HELIOGRAPHIC RESULTS, 1874–1885.

GREENWICH OBSERVATIONS, 1885—*continued.*

PAGE.	COL.	LINE.	
52	2	5	Longitude, *for* 222°·3, *read* 221°·5.
54	2	17–22	Group 1639, *increase* all longitudes by 0°·3.
56	2	18	Area of Whole Spot, *for* 2, *read* 3.
		27	Total Area of Whole Spots, *for* 762, *read* 763.
	2	30–31	*Insert* between lines 30 and 31, the following :—

		1651	0·707	258°·5	281°·0	—11°·1	0	2
		1651	0·691	259·7	279·8	—10·2	0	4

		40	Group 1649, *dele* the entire line.
	Footnote.		Group 1649, *for* April 26–28, *read* April 26–27.
	Footnote.		Group 1649, *dele* and 28.
	Footnote.		Group 1651, *dele*, It is not seen on April 28.
57	1	17	Total Area of Whole Spots, *for* 941, *read* 940.
58	1	36	Greenwich Civil Time, *for* 124·159, *read* 124·279.
	2	2	
59	2	20	Area of Umbra, *for* 0, *read* 2.
60	1	8	Total Area of Umbræ, *for* 122, *read* 124.
61	2	33	Area of Whole Spot, *for* 69, *read* 7.
62	1	10	Total Area of Whole Spots, *for* 1754, *read* 1692.
		30	Area of Umbra, *for* 32, *read* 21.
		35	Total Area of Umbræ, *for* 219, *read* 208.
63	2	16	Area of Umbra, *for* 2, *read* 0.
		23	Total Area of Umbræ, *for* 60, *read* 67.
64	1	4	Total Area of Whole Spots, *for* 389, *read* 789.
65	2	33	Latitude, *for* —11°·7, *read* —1°·7.
69	2	38	Longitude, *for* 201°·1, *read* 202°·1.
	Footnote.		Group 1708, *for* June 20, *read* June 19–20.
75	2	19–21	No. of Group, *for* 1723, *read* 1723*.
		25	Area of Umbra, *for* 19, *read* 2.
		32	Total Area of Umbræ, *for* 206, *read* 189.
75	Footnote.		*Insert* Group 1723*. July 17. Three very small spots.
76	1	9	Area of Umbra, *for* 1, *read* 0.
		24	Total Area of Umbræ, *for* 357, *read* 356.
80	2	11	Total Area of Umbræ, *for* 109, *read* 112.
81	1	3–4	*Insert* between lines 3 and 4 the following :—

		1738	0·364	191°·9	278°·3	—14°·2	0	4

81	1	13	Total Area of Whole Spots, *for* 763, *read* 767.
82	1	7	Area of Umbra, *for* 2, *read* 0.
		19	Total Area of Umbræ, *for* 96, *read* 94.
83	2	21–22	*Insert* between lines 21 and 22 the following :—

		1756*	0·804	87°·2	7°·8	+ 6°·6	0	24

83	2	25	Total Area of Whole Spots, *for* 933, *read* 957.
	Footnote.		*Insert* Group 1756*. Aug. 28. A small spot.
84	2	2	No. of Group, *for* 1759, *read* 1757.
89	2	2	Greenwich Civil Time, *for* 285·381, *read* 282·151.
98	1	17	Longitude, *for* 281°·0, *read* 280°·1.
100	2	6	No. of Group, *for* 1813, *read* 1813*.
		7	
	Footnote.		*Insert* Group 1813*. Dec. 21. Two very small spots.

GREENWICH OBSERVATIONS, 1885—*continued.*

PAGE. COL. LINE.

102 1 5 Area of Whole Spot, *for* 30, *read* 16.

11 Total Area of Whole Spots, *for* 315, *read* 301.

Photographs representing five days in 1885 have been obtained from the Royal Alfred Observatory, Mauritius, further supplementing the measures published in the *Greenwich Observations* for 1885. The results of the measures of these five photographs follow. These results have been used in the formation of the Ledgers in the present Volume.

				°	°	°			
1885.									
212·414	M, H		0·964	247·9	134·6	+22·8			29
			0·933	284·5	128·7	+15·7			105
			0·903	296·1	123·5	+26·1			189
			0·891	252·0	119·4	−13·0			344
		1735	0·886	250·5	118·5	−14·2	0	8	
		1732	0·733	248·1	103·0	−11·6	10	49	
		1733*a*	0·445	165·7	52·5	−19·5	7	40	
M.		1733	0·486	166·7	52·3	−22·2	0	9	
		1733*b*	0·497	160·0	48·7	−21·8	33	202	
		1733	0·474	156·7	47·8	−19·8	0	3	
		1733	0·529	159·9	47·8	−23·8	0	5	
		1733	0·544	160·0	47·4	−24·7	0	4	
		1733	0·524	156·8	46·3	−22·8	11	55	
			0·927	109·5	354·3	−15·5			275
Aug. 1		Centre			(59·2)	(+ 6·0)	(61)	(375)	(922)
233·499	M, M		0·939	255·0	208·0	−11·5			160
		1750	0·768	272·8	190·9	+ 6·6	0	2	67*c*
M.		1748	0·624	236·6	172·9	−14·2	37	224	
Aug. 22		Centre			(140·5)	(+ 7·0)	(37)	(226)	(227)
234·211	SP, M		0·986	252·1	208·6	−16·2			39
			0·853	251·0	186·5	−12·1			107
		1750	0·882	274·1	193·3	+ 7·0	8	19	
		1750	0·863	273·2	191·0	+ 6·4	2	17	} 308*c*
		1750	0·845	273·4	189·0	+ 6·7	2	24	
		1748	0·766	242·4	175·8	−15·7	0	1	
		1748	0·729	244·0	173·3	−13·4	37	203	} 139*c*
M.		1748	0·718	241·8	171·8	−14·5	0	1	
		1754*a*	0·963	103·9	58·9	−11·3	35	187	
		1754	0·983	102·6	53·6	−11·0	0	59	} 516*c*
		1754	0·985	100·6	52·6	− 9·1	0	34	
			0·895	107·6	70·5	−12·3			371
Aug. 23		Centre			(131·1)	(+ 7·1)	(84)	(545)	(1480)
238·509	HE, P		0·837	237·1	123·6	−22·5			52
		1755	0·710	241·9	114·4	−14·1	5	32	
		1755	0·694	240·2	112·6	−14·6	0	4	
		1755	0·672	237·4	110·1	−15·4	11	45	
		1754*a*	0·414	139·5	58·4	−11·4	17	203	
		1754	0·449	130·8	54·2	−10·3	0	14	
M.		1754	0·451	118·0	50·8	− 5·7	8	31	
		1756	0·832	100·9	19·4	− 5·0	0	24	
		1756	0·860	102·0	16·7	− 6·5	0	19	
		1756	0·882	98·3	13·5	− 3·9	0	12	} 193*c*
		1756	0·891	99·3	12·5	− 5·0	0	79	
		1756	0·909	99·0	10·2	− 5·1	13	78	
		1756*	0·912	86·5	8·2	+ 6·1	0	37	99*c*
Aug. 27		Centre			(74·3)	(+ 7·1)	(54)	(578)	(344)

GREENWICH OBSERVATIONS, 1885—*continued.*

				°	°	°			
1885.									
242·210	H, SP		0·854	289·1	84·4	+20·1			71
			0·818	270·1	80·3	+ 4·2			115
			0·770	248·6	72·2	−11·4			361
		1754*a*	0·628	242·4	59·8	−11·0	12	88	
		1754	0·580	243·6	57·0	− 8·8	4	13	
		1754	0·582	241·0	56·8	−10·2	0	16	
		1754	0·612	235·9	56·7	−13·9	0	5	
		1754	0·581	238·5	55·6	−11·4	14	47	
		1754	0·557	241·9	55·1	− 8·9	20	54	
		1754	0·594	233·5	54·8	−14·4	0	4	
		1754	0·561	237·7	54·2	−11·1	0	7	
M.		1758	0·450	239·9	48·4	− 6·4	1	4	
		1758	0·400	232·9	44·1	− 7·1	4	23	
		1756	0·216	168·4	22·9	− 5·0	25	127	
		1756	0·229	160·6	21·0	− 5·2	3	19	
		1756	0·231	151·8	19·1	− 4·6	1	9	
		1756	0·268	140·6	15·6	− 4·8	11	108	
		1756	0·326	128·7	10·7	− 4·7	13	65	
		1757	0·688	80·7	341·7	+11·6	46	238	} 254*c*
		1757	0·714	83·3	339·6	+ 9·8	28	253	
			0·822	102·6	331·8	− 6·0			126
			0·854	77·4	326·2	+14·5			116
			0·939	104·1	317·7	−10·6			162
Aug. 31		Centre			(25·4)	(+ 7·2)	(182)	(1080)	(1205)

MEAN AREAS OF UMBRÆ, WHOLE SPOTS, AND FACULÆ FOR EACH ROTATION OF THE SUN, FROM 1884 DECEMBER 31 TO 1885 DECEMBER 20, AND FOR THE YEAR 1885. Page *103*.

MEAN HELIOGRAPHIC LATITUDE OF THE SPOTS UPON THE SUN'S DISC FOR EACH ROTATION OF THE SUN, FROM 1884 DECEMBER 31 TO 1885 DECEMBER 20, AND FOR THE YEAR 1885. Page *104*.

These two Sections are superseded by the corresponding Tables on pages 314–321 in the present Volume.

GREENWICH OBSERVATIONS, 1888.

TOTAL PROJECTED AREAS OF UMBRÆ, WHOLE SPOTS, AND FACULÆ FOR EACH DAY, AND MEAN PROJECTED AREAS FOR EACH ROTATION OF THE SUN, AND FOR EACH YEAR FROM 1882 TO 1885. Pages *59* to *68*.

This Section is superseded by the corresponding Tables on pages 305–321 in the present Volume.

PUBLICATIONS OF THE SOLAR PHYSICS COMMITTEE.

MEASURES OF POSITIONS AND AREAS OF SUN SPOTS AND FACULÆ ON PHOTOGRAPHS TAKEN AT GREENWICH, DEHRA DÛN, AND MELBOURNE, WITH THE DEDUCED HELIOGRAPHIC LONGITUDES AND LATITUDES, 1878–1881.

PAGE.	COL.	LINE.	
5	1	31	Mean Solar Time, *for* Feb. 26, *read* Feb. 26*.
	2	6–8	The second photograph on March 5 has not been used for the Ledger in the present Volume.
6	2	15	Mean Solar Time, *for* June 4, *read* 153·936.
			Area of Faculæ, *insert* 530*s*.
			After Line 15 :—
			Mean Solar Time, *insert* June 4.
			Total Area of Umbræ, *insert* (9).
			Total Area of Whole Spots, *insert* (52).
			Total Area of Faculæ, *insert* (530).
7	1	4	Latitude, *for* +12°·8, *read* +12°·7.
8	2	8	Latitude, *for* +10°·1, *read* +10°·0.
9	2	16	Total Area of Faculæ, *for* 138, *read* 128.
12	2	44	Area of Umbra, *for* 6, *read* 0.
13	1	5	Longitude, *for* 267°·5, *read* 267°·1.
		6	Longitude, *for* 264°·5, *read* 267°·1.
		25	Longitude, *for* 266°·5, *read* 266°·1.
		40	Longitude, *for* 24·7, *read* 22·7.
	2	3	Longitude, *for* 22°·7, *read* 22·2.
14	2	35	Total Area of Umbræ, *for* 122, *read* 112.
15	2	22–23	The photograph on Jan. 29 has not been used for the Ledger, or for the computation of Projected Areas in the present Volume.
		24	Mean Solar Time, *for* 29·136, *read* 29·036.
		30	Latitude, *for* —15°·6, *read* —15°·5.
		31	Latitude, *for* +19°·2, *read* +19°·3.
16	2	36	Total Area of Whole Spots, *for* 544, *read* 644.
		40	Latitude, *for* +28°·2, *read* +28°·3.
17	2	32–33, 37–38, 45–46	No. of Group, *for* 312, *read* 312*.
18	1	38	Total Area of Umbræ, *for* 40, *read* 50.
		41	Latitude, *for* +19°·7, *read* +19°·6.
19	1	27	Latitude, *for* —20°·3, *read* +20°·3.
	2	30	No. of Group, *for* 317, *read* 317*.
20	1	11	Position Angle, *for* 301°·6, *read* 301°·1.
			Longitude, *for* 201°·9, *read* 201°·2.
		36	Distance, *for* 0·859, *read* 0·864.
			Longitude, *for* 174°·4, *read* 174°·9.
			Latitude, *for* +19°·1, *read* +19°·5.
		37	Distance, *for* 0·859, *read* 0·854.
			Longitude, *for* 174°·4, *read* 174°·0.
			Latitude, *for* 19°·0, *read* +18°·6.
		41	Distance, *for* 0·867, *read* 0·872.
20	1	41	Longitude, *for* 174°·8, *read* 175°·3.
			Latitude, *for* +18°·9, *read* +19°·0.
		42	Distance, *for* 0·867, *read* 0·862.
			Longitude, *for* 174°·8, *read* 174°·3.
			Latitude, *for* +19°·0, *read* +18°·5.
	2	10	Position Angle, *for* 244°·6, *read* 244°·4.
21	2	30	Distance, *for* 0·394, *read* 0·398.
		31	No. of Group, *for* 322, *read* 320.
22	2	32	Area of Umbra, *for* 11, *read* 1.
23	1	13	Longitude, *for* 87°·6, *read* 87°·7.
		43	Total Area of Faculæ, *for* 506, *read* 706.
24	1	45	Position Angle, *insert* 60°·5.
	2	14	Longitude, *for* 153°·3, *read* 153°·5.
		26	Position Angle, *insert* 55°·2.
25	1	15	Longitude, *for* 156°·9, *read* 157°·0.
		30	Distance, *for* 0·388, *read* 0·407.
			Position Angle, *for* 349°·8, *read* 4°·6.
			Longitude, *for* 90°·0, *read* 83°·9.
			Latitude, *for* + 22°·4, *read* + 23°·8.
			Area of Whole Spot, *for* 19, *read* 14.
		31	Total Area of Whole Spots, *for* 77, *read* 72.
		49	Total Area of Whole Spots, *for* 147, *read* 113.
	2	37	Total Area of Umbræ, *insert* (150).
			Total Area of Whole Spots, *insert* (619).
			Total Area of Faculæ, *insert* (1271).
26	1	52	Position Angle, *insert* 122°·5.
		53	Position Angle, *insert* 69°·3.
	2	12	Total Area of Umbræ, *for* 190, *read* 196.
		50	No. of Group, *for* 333, *read* 333*.
27	1	6	No. of Group, *for* 333, *read* 333*.
			Area of Faculæ, *insert* 340*f*.
		7	Area of Faculæ, *insert* 192*c*.
		18	Latitude, *for* — 36°·2, *read* — 36°·0.
		27	No. of Group, *for* 333, *read* 333*.
	2	18	Area of Faculæ, *insert* 722*c*.
		25	Area of Faculæ, *insert* 386*c*.
28	1	39	Total Area of Umbræ, for 96, *read* 86.
29	1	50	Total Area of Whole Spots, *for* 509, *read* 609.
	2	12	Total Area of Faculæ, *insert* (505).
30	1	17	Area of Faculæ, *insert* 635*f*.
		49	Latitude, *for* 13°·9, *read* 18°·9.
	2	35	Total Area of Whole Spots, *for* 1625, *read* 1004.
31	1	40	Total Area of Whole Spots, *for* 197, *read* 199.
	2	Between lines. 26 and 27	Distance, *insert* 0·982. Position Angle, *insert* 109°·8. Area, *insert* 319.
31	2	45	Total Area of Umbræ, *insert* (127).
			Total Area of Whole Spots, *insert* (605).
			Total Area of Faculæ, *insert* (1067).

PAGE.	COL.	LINE.	
32	2	4	Position Angle, *for* 206°·6, *read* 206°·5.
		8	Longitude, *for* 237°·6, *read* 237°·7.
33	1	44	Position Angle, *for* 237°·6, *read* 237°·7.
	2	8	Distance, *for* 0·673, *read* 0·675.
34	1	20	Position Angle, *for* 113°·5, *read* 113°·8.
		30	Longitude, *for* 91°·4, *read* 91°·6.
35	1	19	No. of Group, *for* 360, *read* 361.
		24	Position Angle, *for* 288°·9, *read* 289°·9.
	2	16	Latitude, *for* — 19°·2, *read* 20° 2.
		45	Area of Faculæ, *dele* 49.
		46	Total Area of Faculæ, *for* 49, *read* 0.
36	1	49	Total Area of Faculæ, *for* 2618, *read* 2718.
	2	26	Area of Faculæ, *insert* 117*p*.
		45	No. of Group, *for* 373, *read* 373*.
37	1	8	No. of Group, *for* 373, *read* 373*.
		33	No. of Group, *for* 380, *read* 380‡.
			Position Angle, *for* 67°·9, *read* 67°·8.
		40, 41, 42	No. of Group, *for* 380, *read* 380‡.
		48	No. of Group, *for* 380, *read* 380†.
	2	3, 4	No. of Group, *for* 380, *read* 380*.
		7, 23, 24, 25, 26, 27, 32, 33, 34, 35, 44, 45, 47	No. of Group, *for* 380, *read* 380†.
38	1	10, 12, 13, 28	No. of Group, *for* 380 , *read* 380†.
		49	Total Area of Umbræ, *insert* (139).
		49	Total Area of Whole Spots, *insert* (574).
		49	Total Area of Faculæ, *insert* (1090).
39	1	51	Total Area of Umbræ, *for* 22, *read* 26.
		51	Total Area of Whole Spots, *for* 91, *read* 81.
40	1	17	Distance, *for* 0·916, *read* 0·915.
		44	Total Area of Umbræ, *insert* (257).
			Total Area of Whole Spots, *insert* (1120).
			Total Area of Faculæ, *insert* (2594).
40	2	5	Distance, *for* 0·989, *read* 0·939.
41	2	44	Area of Faculæ, *insert* 344*c*.
42	1	8	Position Angle, *insert* 62°·3.
43	1	8	Mean Solar Time, *for* Dec. 30, *read* Dec. 30*.
			Total Area of Whole Spots, *for* 560, *read* 494.
44	1		Distance, *insert* 0·918.
Between lines 36 and 37			Position Angle, *insert* 108°·8.
			Area of Faculæ, *insert* 286.
	2	31	Total Area of Whole Spots, *for* 738, *read* 753.
45	1	26	Total Area of Whole Spots, *for* 1443, *read* 1439.
	2	11	Total Area of Faculæ, *for* 1902, *read* 1922.
		30	Total Area of Umbræ, *for* 243, *read* 253.
46	2	17	Position Angle, *insert* 73°·0.
47	1	17	Total Area of Faculæ, *for* 7264, *read* 6964.
47	1	33	Total Area of Whole Spots, *for* 508, *read* 518.
	2	10	Total Area of Umbræ, *for* 194, *read* 204.
		44	Total Area of Faculæ, *for* 2418, *read* 2218.
		45	Mean Solar Time, *insert* 54·923.
48	2	22	Position Angle has been omitted, and cannot now be supplied.
		41	Latitude, *for* +18°·5, *read* —18°·5.
		42	Latitude, *for* —19°·7, *read* +19°·7.
		50	Area of Umbræ, *for* 5, *read* 9.
		51	Distance, *for* 0·779, *read* 0·979.
49	2	15	No. of Group, *for* 434, *read* 433.
		30	Mean Solar Time, *for* 74·695, *read* 74·965.
50	1	3	Area of Faculæ, *insert* 586*f*.
	2	51, 7, 8, 9, 15, 16, 22	No. of Group, *for* 441, *read* 441*.
		44	Area of Faculæ, *for* 118, *read* 108.
51	2	13	Area of Faculæ, *insert* 262*c*.
		14	Area of Faculæ, *insert* 445*np*.
52	1	3	Latitude, *for* +23°·1, *read* +23°·0.
	2	47	Total Area of Whole Spots, *for* 546, *read* 775.
53	1	36	No. of Group, *for* 465, *read* 465*.
	2	27	Mean Solar Time, *for* May 4, *read* May 4*.
54	1	24	Mean Solar Time, *for* May 8, *read* May 8*.
		25	Area of Faculæ, *for* 227, *read* 277.
		43	Mean Solar Time, *for* May 10, *read* May 10*.
			Total Area of Umbræ, *for* 77, *read* 87.
	2	39	Area of Faculæ, *for* 413, *read* 423.
		46	Longitude, *for* 207°·0, *read* 206°·8.
55	1	11	Area of Faculæ, *insert* 497*p*.
		14	Area of Faculæ, *for* 1213, *read* 1213*f*.
		14–19	*Diminish* all longitudes on May 21 by 1°·0.
		29	Total Area of Umbræ, *for* 66, *read* 68.
57	2	40	Total Area of Faculæ, *for* 560, *read* 1316.
58	2	7	Total Area of Umbræ, *for* 164, *read* 128.
			Total Area of Whole Spots, *for* 725, *read* 718.
			Total Area of Faculæ, *for* 3252, *read* 4314.
		30	Area of Whole Spot, *for* 70, *read* 75.
		37	Total Area of Whole Spots, *for* 1396, *read* 1401.
59	1	46	Position Angle, *insert* 201°·8.
		47	Position Angle, *insert* 120°·0.
	2	18	Position Angle, *for* 65°·3, *read* 65°·0.
63	1	7	Total Area of Faculæ, *for* 4929, *read* 5129.
	2	5	Total Area of Umbræ, *for* 93, *read* 95.
		14	Position Angle, *insert* 74°·8.
		15	Position Angle, *insert* 140°·7.
		25	Area of Faculæ, *insert* 849*p*.
64	1	4	Area of Faculæ, *for* 255, *read* 270.
	2	47	Position Angle, *for* 72°·7, *read* 72°·4.
65	2	18	Area of Faculæ, *insert* 1133*sp*.
66	1	22	Area of Faculæ, *insert* 572*f*.
		23	Area of Faculæ, *insert* 188*p*.
		30	Area of Faculæ, *for* 316, *read* 326.
67	1	18	Area of Faculæ, *insert* 260.
		27	Position Angle, *for* 53°·0, *read* 54°·0.
		40	Area of Faculæ, *insert* 585*c*.

Errata.

PAGE.	COL.	LINE.	
67	1	48	Position Angle, *for* 60°·1, *read* 60°·0.
68	2	26	Area of Faculæ, *insert* 74°·2.
		27	Area of Faculæ, *insert* 116·5.
69	1	16	Area of Umbra, *for* 24, *read* 22.
	2	21	Total Area of Whole Spots, *for* 655, *read* 685.
		31	Total Area of Whole Spots, *for* 886, *read* 916.
		53	Mean Solar Time, *for* Oct. 12, *read* Oct. 12*.
71	1	28	Total Area of Umbræ, *for* 210, *read* 209.
	2	25	Distance, *for* 0·956, *read* 0·966.
72	2	38	Longitude, *for* 251·6, *read* 251°·9.
73	1	19–29	The Indian photograph for Nov. 16 does not show Groups 601 and 608, which are seen on the Greenwich photograph for that date. The Greenwich measures for those two groups have therefore been adopted in the formation of the Ledgers in the present volume; increasing the Total Area for Whole Spots in line 29, *from* 1105 *to* 1117.
75	1	23	Total Area of Umbræ, *for* 191, *read* 201.
77	1	13	Area of Faculæ, *insert* 204c.
	2	14	Total Area of Umbræ. *for* 32, *read* (32).

Record of Absence of Spots in the Years 1878–1881.

PAGE.	LINE.	
77	8	1878 March, *insert* 91 I.
78	12	1879 March, *insert* 16 I.
	15	1879 May, *for* 17 I, *read* 17.
	23	1879 November, *insert* 6.
	27	1880 February, *insert* 14 Me.
		1880 February, *for* 16 I, *read* 16 Me.
	28	1880 March, *for* 23 I, *read* 23.
	29	1880 April, *for* 22 I, *read* 22 Me.
	31	1880 June, *insert* 14 Me.
	32	1880 July, *insert* 17 Me.
	36	1881 January, *insert* 15 I.
	37	1881 August, *insert* 14 I, *and* 16 I.
After 37		*Insert* October 31 I.

PHOTO-HELIOGRAPHIC RESULTS, 1874-1885.

MEASURES OF POSITIONS AND AREA OF SUN SPOTS AND FACULÆ ON PHOTOGRAPHS TAKEN IN THE YEARS, 1874–1877.

Photographs taken on the following additional dates show neither Spots nor Faculæ :—

1874, April 20, 21, 22, 23.
June 8, 9.
October 26, 27, 29.
December 3.
1875, January 28.
February 15, 16.
1876, March 3.
September 12, 20.
November 24, 27, 30.
December 1, 2, 7, 12, 14.
1877, May 30.
June 12, 17, 18, 19, 20, 21, 22.
July 6, 7, 13, 24, 25, 26, 29.
August 9, 12, 16, 17, 18, 20, 21.
September 22.
October 2, 3, 8, 9, 11, 12, 15, 16, 18, 20.
November 20.
December 28.

PAGE.	COL.	LINE.	
3	2	28	Group 96. *Dele* the entire line.
		29	Total Area of Whole Spots, *for* 588, *read* 541.
	Footnote		Group 96, *for* June 25–July 4, *read* June 27–July 4.
8	1	13	Area of Faculæ, *insert* 662*p*.
		19	Total Area of Faculæ, *for* 4898, *read* 5560.
	2	8	Area of Faculæ, *insert* 1702*p*.
		10	Total Area of Faculæ, *for* 0, *read* 1702.
12	2	24	Longitude, *for* 316°·3, *read* 320°·4.
13	2	24	No. of Group, *for* 150*, *read* 150.
14	1	23	Position Angle, *for* 250°·9, *read* 257°·3.
			Longitude, *for* 9°·5, *read* 9°·9.
			Latitude, *for* −19°·3, *read* −14°·3.
15	2	4	Greenwich Civil Time, *insert* H.
17	2	16	*For* No Spots or Faculæ, *read* No photograph.
19	2	23	*For* No Spots or Faculæ, *read* No photograph.
21	1	22	Greenwich Civil Time, *for* Sept. 23, *read* Sept. 22.
23	2	28	*For* No Spots or Faculæ, *read* No photograph.
28	1	19	No. of Group, *dele* 201.
	2	18	No. of Group, *dele* 208.
30	2	14	*For* No Spots or Faculæ, *read* No photograph.
34	2	22	*For* No Spots or Faculæ, *read* No photograph.
35	2	29	*For* No Spots or Faculæ, *read* No photograph.
40	Footnote		Group 246, *insert* Another distant companion is seen on May 17.
45	1	12	Area of Faculæ, *for* 644, *read* 464.
	2	4	Greenwich Civil Time, *for* Dec. 7, *read* Dec. 8.
		7	Greenwich Civil Time, *for* Dec. 11, *read* Dec. 14.
		8	Greenwich Civil Time, *for* Dec. 14, *read* Dec. 17.
		10	Greenwich Civil Time, *for* Dec. 15, *read* Dec. 18.
		11	Greenwich Civil Time, *for* Dec. 17, *read* Dec. 26.

LEDGERS OF AREAS AND POSITIONS OF GROUPS OF SUN SPOTS FOR THE YEARS 1878–1881.

PAGE.	GROUP.	DATE.	
89	317	Apr. 8	Longitude, for 174°·6, *read* 174°·7.
			Latitude, *for* +19°·0, *read* +18°·8.
		Means	Longitude, *for* 173°·79, *read* 173°·80,
			Latitude, *for* +18°·30, *read* +18°·28.
96	368	Oct. 4	Projected Area of Whole Spot, *for* 12, *read* 122.
114	487	June 9	Projected Area of Whole Spot, *for* 775, *read* 175.
120	528	Aug. 2	Area of Whole Spot, *for* 511, *read* 51.
		Means	Mean Area of Whole Spot, *for* 274, *read* 228.
126	576	Oct. 4	Projected Area of Umbra, *for* 40, *read* 37.
			Area of Umbra, *for* 24, *read* 22.

Page 85, Group 296, *substitute* the following :—

Group 296.

One small spot, not seen on November 26.

d						°	°	°
Nov. 25·554	G	3	15	5	23	27·1	−12·2	−70·9
26	Ma	0	0	0	0	...	...	...
27	...	No photograph		...	...	...	...	...
28·547	G	17	39	11	25	22·5	−13·3	−36·1
29·174	Ma	0	26	0	15	22·5	−13·3	−27·8
Means ...	...	...	...	4	16	24·03	−12·93	...

Page 89, Group 316A, *substitute* the following :—

Group 316A.

A few spots, mostly small, in a stream inclined at a considerable angle to the equator. The group is not seen on March 28.

1880.d						°	°	°
Mar. 27·217	I	9	33	5	18	287·1	−30·8	+ 4·9
28	...	0	0	0	0	...	...	...
29·175	I	31	138	20	87	288·8	−29·2	+32·5
30·312	I	30	146	24	114	288·9	−28·9	+47·5
31·303	I	16	84	16	84	287·3	−28·7	+58·9
Means ...	...	...	...	13	61	288·03	−29·40	...

Pages 93 and 94, Group 349, *substitute* the following :—

Group 349.

A small spot on August 21, not seen on August 22. The group has re-appeared as a pair of small spots by August 23. It is not seen on August 25, 26 or 27, but has reappeared again by August 28, and has greatly increased in size by August 30 and 31.

d						°	°	°
Aug. 21·503	G	17	33	19	36	71·2	+23·1	−63·4
22·261	I	0	0	0	0	...	...	...
23·205	I	17	65	12	46	67·8	+22·2	−44·3
24·216	I	35	122	21	72	69·8	+22·7	−29·0
25	...	0	0	0	0	...	...	...
26	...	0	0	0	0	...	...	...
27	...	0	0	0	0	...	...	...
28·506	G	0	39	0	22	66·7	+22·0	+24·6
29·236	I	43	174	27	109	66·0	+21·8	+33·5
30·285	I	95	459	72	348	66·8	+21·6	+48·2
31·516	G	68	469	74	514	66·0	+21·9	+63·7
Sept. 1·404	G	26	252	51	443	65·7	+22·0	+74·6
2·517	G	0	55	0	218	61·3	+23·8	+85·4
Means ...	...	...	...	21	139	66·81	+22·34	...

LEDGERS OF AREAS AND POSITIONS OF GROUPS OF SUN SPOTS FOR THE YEARS 1882–1885.

PAGE.	GROUP.	DATE.	
162	862	Oct. 21	Projected Area of Whole Spot, *for* 557, *read* 574.
			Area of Whole Spot, *for* 322, *read* 332.
			Longitude, *for* 167°·5, *read* 167°·6.
162	862	Oct. 21	Longitude from Central Meridian, *for* +29°·1, *read* +29°·2.
		Means.	Mean Area of Whole Spot, *for* 170, *read* 172.
			Mean Longitude, *for* 168°·55, *read* 168°·57.
187	1062	June 27	Area of Umbra, *for* 209, *read* 228.
			Area of Whole Spot, *for* 1227, *read* 1391.
187	1062	June 27	Latitude, *for* +9°·7, *read* +9°·6.
		Means.	Mean Area of Umbra, *for* 218, *read* 220.
			Mean Area of Whole Spot, *for* 1353, *read* 1366.
			Mean Latitude, *for* +10°·49, *read* +10°·48.
197	1137	Oct. 8.	Area of Whole Spot, *for* 142, *read* 144.

Page 162. Group 859, *substitute* the following :—

Group 859.

Four or five small spots arranged in a straight line.

Oct. 16·191	0	98	0	50	193·6	+15·2	−10·7
17·323	15	132	8	67	195·3	+15·1	+ 5·8
18·336	34	69	18	37	194·3	+15·0	+18·2
19·309	13	77	8	46	194·7	+15·7	+31·4
20·491	8	75	6	56	195·7	+15·6	+48·1
21·196	0	16	0	15	196·0	+15·2	+57·6
Means ...	...	...	7	45	194·93	+15·30	...

Group 859.*

A small spot.

Oct. 22·635	2	24	4	43	193·8	+9·7	+74·4
Means ...	...	...	4	43	193·8	+9·7	...

TOTAL PROJECTED AREAS OF SUN SPOTS AND FACULÆ FOR EACH DAY IN THE YEARS, 1874–1885.

PAGE.	DATE.	
290	1874 June 25.	Area of Whole Spots, *for* 361, *read* 278.
295	1877 March 30.	*For* 0 0 0, *read* No photograph.
301	1880 June 28.	Area of Faculæ, *for* 1033, *read* 1580.
311	1885 August 30.	Area of Faculæ, *for* 285, *read* 993.

ROYAL OBSERVATORY, GREENWICH.

MEASURES OF POSITIONS AND AREAS

OF

SUN SPOTS AND FACULÆ

ON

PHOTOGRAPHS

TAKEN

AT GREENWICH, AT HARVARD, AND AT MELBOURNE,

WITH THE DEDUCED

HELIOGRAPHIC LONGITUDES AND LATITUDES.

1874—1877.

MEASURES of POSITIONS and AREAS of SUN SPOTS and FACULÆ on PHOTOGRAPHS taken at the ROYAL OBSERVATORY, GREENWICH, at HARVARD COLLEGE OBSERVATORY, CAMBRIDGE, U.S.A., and at the GOVERNMENT OBSERVATORY, MELBOURNE, in the Years 1874 to 1877.

NOTE.—The Greenwich Civil Time at which the Photograph was taken is expressed by the Day of the Year and decimals of a day, reckoning from Midnight, January 1^{d} 0^{h}. For convenience of reference, the Month and Day of the Month (Civil Reckoning) are added.

The letter H. signifies that the photograph was taken at Harvard; the letters Me. that the photograph was taken at Melbourne; the time given is Greenwich Civil Time.

The position-angles are reckoned from the North Pole of the Sun's Axis in the direction N., E., S., W., N.

The Groups of Spots are numbered in the order of their appearance. When there is no number in the third column, it is to be understood that there is a Facula unaccompanied by a Spot. The positions of Faculæ relative to the Spots with which they are associated are indicated by the letters *n, s, p, f, c*, denoting respectively north, south, preceding, following, concentric. The longitude and latitude of the centre of the disk are given in brackets.

The Areas of Spots and Faculæ are expressed in millionths of the Sun's visible Hemisphere.

Greenwich Civil Time.	Measurers.	No. of Group, and Letter for Spot.	Distance from Centre in terms of Sun's Radius.	Position Angle from Sun's Axis.	Heliographic Longitude.	Heliographic Latitude.	Spots. Area of UMBRA for each Spot (and for Day).	Spots. Area of WHOLE for each Spot (and for Day).	Faculæ. Area for each Group (and for Day).
1874.				°	°	°			
106·485	JB, B	82	0·388	61·2	113·3	+ 5·8	0	113	
Apr. 17		Centre			(133·2)	(− 5·3)	(0)	(113)	(0)
107·506	JB, B	82	0·210	26·7	114·3	+ 5·6	0	60	
Apr. 18		Centre			(119·7)	(− 5·2)	(0)	(60)	(0)
116·556	JB, B	83	0·899	101·7	296·0	− 12·4	0	171	
Apr. 27		Centre			(0·1)	(− 4·4)	(0)	(171)	(0)
117·574	M, M	83	0·766	102·6	297·0	− 12·4	41	221	
Apr. 28		Centre			(346·7)	(− 4·3)	(41)	(221)	(0)
118·663	M, M	83	0·594	105·8	296·6	− 12·6	33	189	
Apr. 29		Centre			(332·3)	(− 4·2)	(33)	(189)	(0)
119·577	JB, B	83	0·428	112·1	296·3	− 13·0	40	205	
		84	0·284	316·8	331·5	+ 7·9	0	24	
Apr. 30		Centre			(320·2)	(− 4·1)	(40)	(229)	(0)
120·539	M, M	83	0·249	130·0	296·2	− 13·0	32	191	
		84	0·455	295·6	331·8	+ 7·7	0	34	
		85	0·893	92·1	244·4	− 3·7	0	42	
May 1		Centre			(307·5)	(− 4·0)	(32)	(267)	(0)
121·499	JB, B	83	0·167	187·3	296·0	− 13·3	45	178	
		84	0·622	288·1	331·3	+ 8·0	0	29	
		85	0·777	91·9	243·9	− 3·9	11	132	
May 2		Centre			(294·8)	(− 3·9)	(56)	(339)	(0)
123·571	JB, B	83	0·500	248·6	295·9	− 13·7	25	164	
		85	0·330	93·8	248·2	− 4·7	28	314	
May 4		Centre			(267·4)	(− 3·6)	(53)	(478)	(0)
124·490	JB, B	83	0·660	253·2	295·6	− 13·6	16	133	
		85	0·128	102·6	248·1	− 5·1	31	277	
May 5		Centre			(255·2)	(− 3·5)	(47)	(410)	(0)
125·432	JB, B	83	0·797	256·0	295·1	− 13·2	21	188	
		85	0·083	245·6	247·1	− 5·4	11	324	
		86	0·951	82·0	171·5	+ 6·5	0	248	
May 6		Centre			(242·8)	(− 3·4)	(32)	(760)	(0)
126·515	JB, B	83	0·920	256·5	295·2	− 13·7	34	188	
		85	0·344	263·8	248·4	− 5·3	39	264	
		86	0·848	79·1	171·5	+ 7·4	72	467	
		87	0·953	96·2	156·1	− 6·9	93	954	
May 7		Centre			(228·5)	(− 3·3)	(238)	(1873)	(0)
127·552	M, M	85	0·558	264·8	248·5	− 5·6	42	258	
		86	0·700	75·8	171·7	+ 7·5	98	494	
		87	0·859	95·8	155·6	− 6·6	39	1075	
May 8		Centre			(214·7)	(− 3·2)	(179)	(1827)	(0)
128·497	JB, B	85	0·721	265·9	248·3	− 5·1	35	233	
		86	0·537	70·9	171·6	+ 7·4	64	378	
		87	0·735	96·7	155·1	− 7·0	130	852	
		88	0·787	299·3	249·1	+20·5	0	68	
May 9		Centre			(202·3)	(− 3·1)	(229)	(1531)	(0)
130·526	JB, B	85	0·958	265·4	248·7	− 5·2	0	100	1149*sf*
		86	0·180	15·4	172·7	+ 7·1	4	196	
		87	0·330	104·0	156·7	− 7·2	52	427	
		88	0·953	294·1	244·8	+21·9	0	44	
May 11		Centre			(175·4)	(− 2·9)	(56)	(767)	(1149)

Group 82, April 17–18. Single spot, which breaks up into two on April 18.
Group 83, April 27–May 7. Single spot.
Group 84, April 30–May 2. Small scattered group.
Group 85, May 1–11. A large spot, with several small ones near it.
Group 86, May 6–11. Two large spots.
Group 87, May 7–18. A large group of many spots.
Group 88, May 9–11. A group of three small spots, widely separated.