Kodaikanal Observatory.

BULLETIN No. LXXXIV

SUMMARY OF PROMINENCE OBSERVATIONS FOR THE SECOND HALF OF THE YEAR 1927

In pursuance of the programme of work adopted since 1st January 1923 under the auspices of the International Astronomical Union, all observatories taking spectroheliograms of the sun have been asked to co-operate with the Kodaikanal Observatory by supplying copies of their photographs on those days when the Kodaikanal records are imperfect or wanting. In response to our requirements for the second half of the year 1927, the Mount Wilson Observatory supplied prominence plates for 49 days and Hα disc plates for 35 days; Meudon Observatory supplied K_3 disc plates for 6 days and Hα disc plates for 10 days, and the Pitch Hill Observatory (Mr. Evershed's) at Ewhurst, Surrey, England, supplied 10 prominence plates and 3 Hα disc plates.

When only incomplete or imperfect photographs for any day are available from more than one observatory, the best photograph is chosen as representing the solar activity of that day after weighting it according to its quality, and the remaining photographs are ignored.

The mean daily areas and numbers of prominences during the half-year are given below. The means are corrected for incomplete or imperfect observations, the total of 181 days for which plates were available being reduced to 155 effective days.

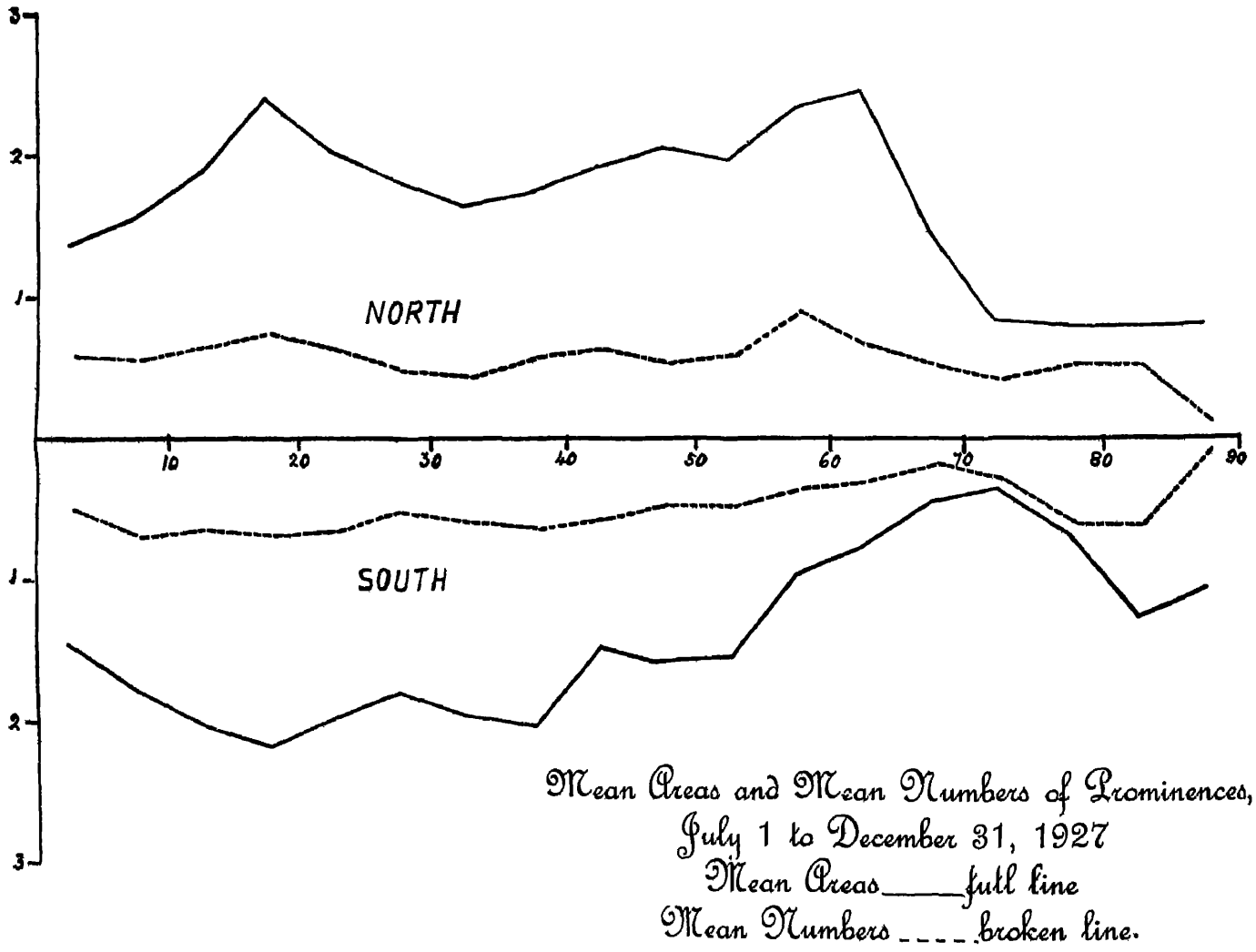
	Mean daily areas (square minutes)	Mean daily numbers
North	2 97	9 99
South	2·54	9·04
Total .	5 51	19 03

Compared with the first half of the year, areas show a decrease of about 27 per cent in both hemispheres, and numbers show a slight decrease in the southern hemisphere only.

For comparison with bulletins issued prior to the co-operation of other observatories, the means based on Kodaikanal photographs alone are also given, 145 days of observation being counted as 129½ effective days.

	Mean daily areas (square minutes).	Mean daily numbers
North (Kodaikanal photographs only)	3 03	10 34
South (do.)	2·47	9·39
Total . .	5·50	19·73

The distribution of prominences in latitude is represented in the following diagram, in which the full line gives the mean daily areas and the broken line the mean daily numbers for each zone of 5° of latitude. The ordinates represent tenths of a square minute of arc for the full line and numbers for the broken line. The high latitude activity typical of the period of maximum activity of the sunspot cycle is still evident in prominence numbers although much reduced according to prominence areas when compared with the first half of the year. The areas in the belt 0°-5° North and South of the equator are about one-half of those in the first half of the year.



Mean Areas and Mean Numbers of Prominences,
July 1 to December 31, 1927
Mean Areas ____ full line
Mean Numbers ____ broken line.

The monthly, quarterly and half-yearly areas and numbers, and the mean height and mean extent of the prominences on photographs from all the co-operating observatories are given in Table I. The unit of area is 1 square minute of arc. The mean height is derived by adding together the greatest heights reached by individual prominences and dividing by the total number of prominences observed; the mean extent is derived by adding together the lengths of the base on the chromosphere of individual prominences and dividing by the total number of prominences.

TABLE I.—ABSTRACT FOR THE SECOND HALF OF 1927.

Months.	Number of days (effective).	Areas.	Numbers	Daily Means		Mean height	Mean extent
				Areas	Numbers		
1927						"	°
July	23¾	169 3	408	7 1	17 1	33 0	4 75
August	23¼	119·4	511	5 1	21 9	34 5	4 15
September	25½	147 1	507	5·9	19 9	33 9	4 80
October	27	135 0	472	5 0	17 5	35 5	4 98
November	26	108 8	537	4 2	20 7	32 8	4 09
December	29½	174 4	516	5 9	17 5	38·1	5 36
Third quarter	72½	435 8	1426	6·0	19 7	33 9	4 55
Fourth quarter	82½	418 2	1525	5 1	18 5	35 4	4 80
Second half-year	155	854 0	2951	5·5	19 0	34 7	4 68

Distribution east and west of the Sun's axis

During the half-year both areas and numbers showed a slight excess at the western limb compared with the eastern limb as will be seen from the following table —

1927 July to December	East.	West.	Percentage East
Total number observed	1428	1525	48·4
Total areas in square minutes	418·6	435·2	49 0

Metallic prominences.

Eighteen metallic prominences were observed during the half-year. Their details are given below :—

TABLE II.—LIST OF METALLIC PROMINENCES OBSERVED AT KODAIKANAL, JULY TO DECEMBER 1927.

Date.		Hour I.S.T		Base.	Latitude.		Limb.	Height	Lines
					North.	South			
1927.		H.	M.	°	°	°		"	
July	15	9	8	4		11	W	15	4924·1, 5016, 5018·6, b_4, b_3, b_2, b_1, 5276·0, 5263·0, 5316·8, D_2, D_1
August	30	8	28	2		10	W	10	6677 and 7065 only
	31	9	0	6		10	W	20	4924·1, 5016, 5018·6, b_4, b_3, b_2, b_1, 5276·0, 5316·8, 5363·0, D_2, D_1, 6677, 7065.
September	4	8	46	4		13	E	20	4924·1, 5016, 5018·6, b_4, b_3, b_2, b_1, 5276·0, 5316·8, 5363·0, D_2, D, 6677, 7065
	13	8	37	4		4	E	20	4924·1, 5016, 5018·6, b_4, b_3, b_2, b_1, 5276·0, 5316·8, 5363·0, D_2, D_1, 7065.
	14	9	34	3	30·5		E	10	4924·1, 5018·6, b_4, b_3, b_2, b_1, 5234·9, 5276·0, 5316·8, 5363·0, D_2 D_1
	19	9	10	3		16·5	E	20	4924·1, 5016, 5018·6, b_4, b_3, b_2, b_1, 5233·0, 5276·2, 5316·8, 5363·0, D_2, D_1, 6677, 7065
October	2	9	8	2	18		W	15	4924·1, 5016, 5018·6, b_4, b_3, b_2, b_1, 5276·0, 5316·8, 5363·0, 6677, 7065
	8	9	20	1		9·5	E	10	4924·1, 5018·6, b_4, b_3, b_2, b_1, 5234·8, 5276·0, 5316·8, 5363·0, D_2, D_1, 6677, 7065.
	12	9	25	4		2	E	20	b_4, b_3, b_2, b_1, 5316·8, D_2, D_1.
	16	11	46	3	16·5		W	20	4924·1, 5016, 5018·6, b_4, b_3, b_2, b_1 5276·0, 5316·8, D_2, D_1, 6677, 7065.
November	15	9	30	1		20·5	W	5	4924·1, 5018·6, b_4, b_3, b_2, b_1, 5234·8, 5276·0, 5316·8, 5363·0, D_2, D_1.
	16	9	6	3		20·5	W	20	4924·1, 5016, 5018·6, b_4, b_3, b_2, b_1, 5227·4, 5269·8, 5276·0, 5363·0, D_2, D_1, 6677.
	22	9	43	1	1·5		W	5	b_4, b_3, b_2, b_1, D_2, D_1, faintly reserved
	26	9	41	1	30·5		E	5	4924·1, 5018·6, b_4, b_3, b_2, b_1, 5269·8, 5276·0, 5316·8, 5328·6, 5363·0, D_2, D_1, 7065.
	27	9	14	3	31·5		E	10	5016, 5018·6, b_4, b_3, b_2, b_1, 5276·0, 5316·8, D_2, D_1
December	27	10	5	1		3·5	E	15	4924·1, 5018·6, b_4, b_3, b_2, b_1, 5234·8, 5276·2, 5316·8, 5363·0, D_2, D_1, 7065.
	28	9	40	3		1·5	E	5	4924·1, 5018·6, b_4, b_3, b_2, b_1, 5234·8, 5276·2, 5316·8, 5363·0, D_2, D_1, 6677, 7065

The distribution in latitude of the metallic prominences was as follows :—

	1°—10°	11°—20°	21°—30°	31°—40°	Mean latitude.	Extreme latitudes.
North	1	2	2	1	21° 4	1°·5 and 31° 5
South	7	5	0	0	10°·9	1°·5 and 20°·5

Ten were on the east limb and 8 on the west limb.

Displacements of the hydrogen lines

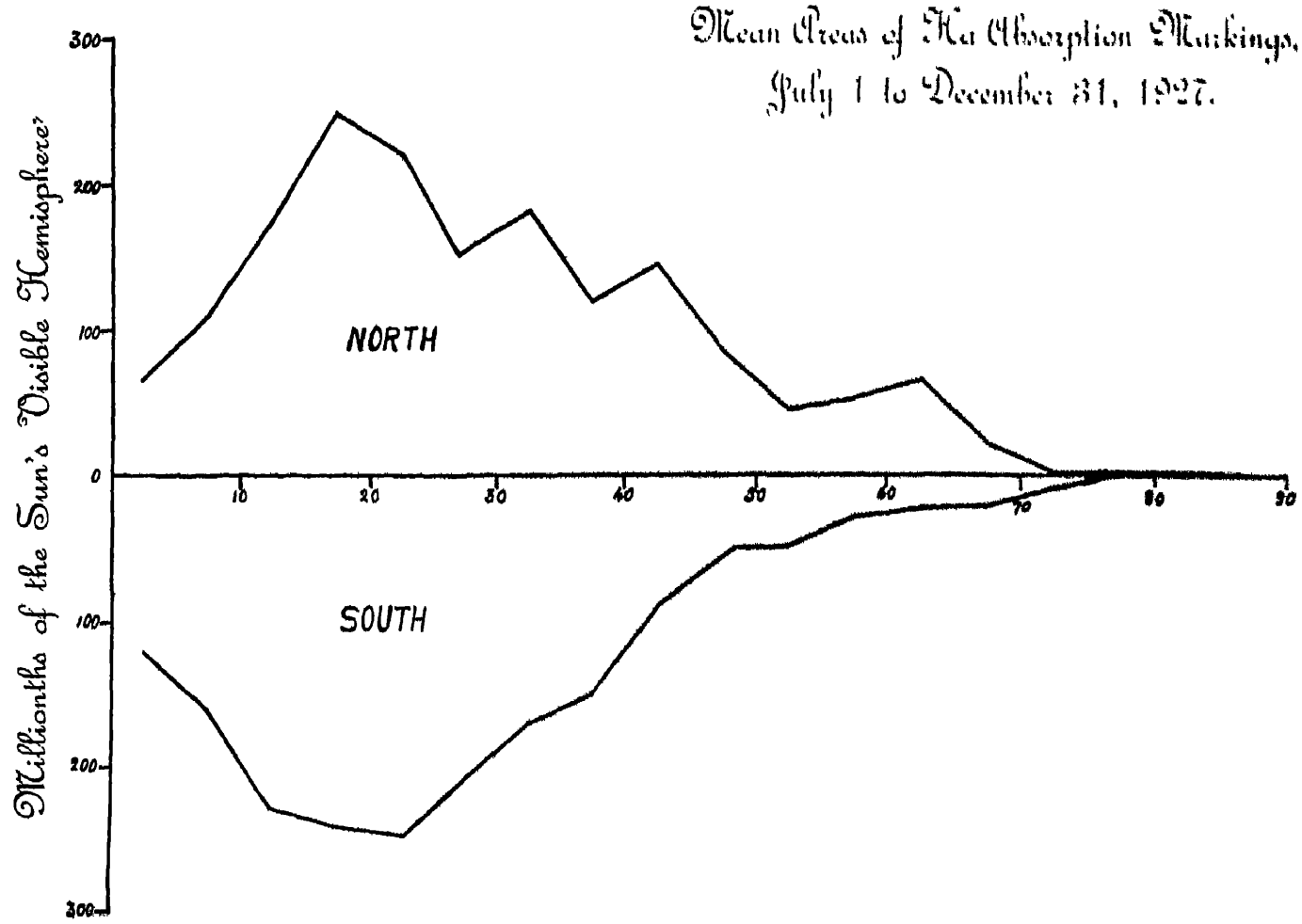
Particulars of the displacements observed in the chromosphere and prominences are given in the following table :—

TABLE III —DISPLACEMENTS OF THE HYDROGEN LINES.

Date		Hour I.S.T.		Latitude.		Limb	Displacement.			Remarks
				North	South		Red	Violet.	Both ways	
1927.		H	M.	°	°		A.	A	A	
July	14	9	1		28	E		Slight		At top
	15	8	51	65 5		E		Slight		No prominence
	15	9	16		11	W		1		At base
	15	9	0	34		W	0 5			At top
	18	9	52		39	W		Slight		At base
	28	11	28		13	W	1			At top
	29	9	40		9	E		0 5		Do
	29	9	43		50·5	E	1			At base
August	3	9	20		72	E		Slight		At top.
	4	9	41		34	E	0 5			Do
	5	9	57	21		W	1	2		To red at top , to violet at base.
	7	9	31		38	W	1			At top.
	7	9	27	11		W		0·5		At base
	7	9	38	33		W	1 5			Do
	8	9	46	13		W		1		Do.
	9	11	25		20	W	1	1 5		To red at top , to violet at base
	17	9	51		11	E	Slight			In chromosphere.
	17	9	36		36	W	0 5			At base
	18	9	12		16	E	1	0 5		To red at base , to violet at top.
	19	9	6	24		E		0 5		At top
	19	9	0		22	W		Slight		At base.
	22	10	30	22		E	1			At top.
	22	10	28		28	W	0·5			Do
	23	8	39	18		E	1 5			Do.
	23	8	29		55	W		Slight		
	23	8	23		31 5	W		0·5		At base
	23	8	22		30	W	0 5			At top
	25	10	40	8		W	2			Do.
	26	10	19		16	E		1		Do.
	26	10	23		50	E	2	1		To red at base , to violet at top.
	26	8	40	24		W	0 5			At top
	26	8	32	59		W	0·5			Do.
	29	9	16	83		E	0 5			At base.
	29	9	3	62		E		0 5		Do.
	29	9	20	6		E	1			Do.
	30	8	24	80		E		Slight		
	30	9	0		14	E	0·5			At base
	30	8	40		36·5	W	0·5	1		To red at base , to violet at top.
	30	8	28	76		W		1		At base
	31	9	0		13 5	W	2			At top
	31	9	0		9	W		4		At base
	31	8	54	24		W	1			At top.
September	2	8	24	65		W	0 5			
	4	9	12	44 5		E	0 5			At base.
	4	9	14	38 5		E	Slight			Do.
	4	9	16		3	E		1 5		At top
	4	8	40		10	E	1	3		To red at base , to violet at top
	4	9	1		13	E	10			At base
	4	9	18		9	E		8		At top.
	5	8	34		11	E	1	2		To red at base , to violet at top.
	5	8	48		43 5	W	0 5			At top.
	5	8	32	34		W	1			Do
	6	9	15		68	W		Slight		At base
	7	9	22	35		W	1			Attop.
	9	9	34		9	W		1		Atbase.
	9	9	27	58·5		W		Slight		Do
	9	9	15	82		W	0 5			At top.

Date.		Hour I S.T.		Latitude. North.	Latitude. South	Limb.	Displacement. Red.	Displacement. Violet.	Displacement. Both ways.	Remarks.
1927.		H.	M.	°	°		A.	A.	A.	
September	10	10	5		60	W	1			At top.
						E		0 5		Do.
	11	8	27	75·5		E	Slight			At base.
	11	8	27	73 5		E	1			Do.
	11	8	35		9	E	1			At top
	11	8	21		17	W	0·5			Do.
	11	8	17	77 5		W	0·5			Do.
	12	10	2	22		E	0·5			Do.
	12	9	48	82 5		W	Slight			
	13	8	21	60 5		E	0 5			At base.
	13	9	20	24		E	1 5	1		To red at base , to violet at top.
	13	9	24	18		E	Slight			At base.
	13	8	37		5	E	1			
	14	9	45	38 5		E		0·5		At top.
	14	9	43	24		E		1		Do
	14	9	14		6	E		1		Do
	15	10	36		13	E	Slight			At base.
	15	10	45		68	E			1	
	15	9	58		18	W	0 5			At top.
	19	8	52	61		E	2	3		To red at base ; to violet at top.
	19	9	7	17		E		0·5		At base.
	19	9	3		8	W	1			At top.
	19	8	58	45 5		W	Slight			At base.
	20	10	40	52 5		E	1	1		To red at base , to violet at top.
	20	10	58		18	W	1			At top.
	20	10	58		13	W	Slight			
	20	10	45	77		W		Slight		
	21	9	20	69		E	0 5			At top.
	25	8	53	53		W				
October	2	9	20	81·5		E		Slight		
	2	9	22	23		E	1			At base.
	2	9	24	17		E		1		At top.
	2	9	32	16		E	1			At base.
	2	9	26	12		E	1			Do.
	2	9	18		73 5	W	Slight			At top.
	2	9	3	18		W	2·5			Do.
	2	9	14	20		W		1		At base.
	2	9	1	42 5		W		Slight		Do.
	3	9	7	69		E	0·5			At top.
	3	9	21		19	E	0·5			At base.
	3	9	12	14		W	1·5	1		To red at top ; to violet at base.
	3	9	9	72		W		Slight		At base.
	4	9	41		3 5	E			1	At top.
	4	9	40		7 5	E			1	Do.
	4	9	13		22	W	2			Do.
	5	10	10		21	W	1			Do.
	6	11	35	20		E	1			Do.
	6	11	5		2·5	E		1		
	6	11	15		24	E		1		At top.
	6	11	50		38	W	1			Do.
	7	10	9	25		E	1			
	7	10	0	18		E	2			
	7	9	53		13	E	1			At top.
	8	10	0	31		E		Slight		Do.
	8	9	15		8	E	Slight	1		To red at base ; to violet at top.
	8	9	0		12	E		1		At top.
	8	10	28	48		W	2			
	9	9	0	53 5		E	Slight			At top.
	9	9	2	29		E	1·5			Do.
	9	8	49	67		W	Slight			Do.
	9	9	4	63·5		E	1			Do.
	9	9	20	17		E		1		Do.
	9	9	12		12	W		0·5		At base.
	9	9	9	9		W	1			At top.
	11	10	31	Equator		E		1		Do.
	11	10	26		2	E		1		Do.
	12	9	12	64		E	Slight			At base

Date.		Hour I S T		Latitude		Limb	Displacement.			Remarks.
				North.	South.		Red.	Violet.	Both ways.	
1927.		H	M	°	°		A.	A.	A.	
October	12	9	14	26		E	0 5			At base
	12	9	25		2	E	1			Do
	12	9	0		12	E	0 5			Do
	16	11	53	24		E	1 5			At top.
	16	11	46	17		W	2	1		Red at base, to violet at top
	17	10	4		30	W	1			At base
	17	10	1	Equator		W	0 5			At top
	18	10	15	59		W	1			Do
	19	9	44		26	E	1 5			At base
	19	9	39		17	W	1			At top.
	19	9	36	33		W	1			Do.
	22	10	25		42	E		1		Do
	22	9	55		22	W		1		At base
	23	9	3	17		E	1			Do
	23	9	20		42	W	2			At top
	24	8	51		5	W	1			Do
	24	8	41	37		W	1			Do
	26	9	11	24		E	1			At base.
	26	9	2		9	W		1		Do
	29	9	18	15		E	1			Do
	29	9	5		23	W	Slight			At top
	30	10	49		25	W	0 5			Do
	31	9	25		17	E	Slight			At base
November	2	10	10	79		E		Slight		At base.
	2	10	13	68		W		0 5		Do
	3	9	15	60		E	0 5			
	9	10	12		3	E	1			At base.
	13	9	20	35		E	0·5			Do
	13	9	38	7		E		0 5		At top
	14	10	39	45		E	Slight			At base.
	14	10	36	54		W	0 5			At top.
	15	10	1	13		E	1 5			At base.
	15	10	1	15		E		0 5		At top
	15	9	30		17 5	W	1			Do
	16	9	24	27		E	Slight			
	16	9	27		20	E	0 5			At base
	16	9	20		63	W		Slight		No prominence.
	16	9	6		20	W	1			At top
	16	9	6		18	W		1		
	19	10	23		16	W	1			At base
	19	9	13	28		W	1			At top.
	21	9	10		11	W		0 5		At base.
	21	9	0	61		W	1 5			At top.
	22	10	9	25		E		0 5		Do
	22	9	58		75	W	Slight			Do
	22	9	55		41	W	0 5			Do
	22	9	52		16	W	0·5			Do
	22	9	36		10	W		1		At base
	22	9	39		6	W	1			At top
	22	9	35	7		W	1			Do
	23	9	0	58		E		0 5		At base
	23	9	12	27		E		1		At top
	23	9	7	3		W	1			Do
	24	9	58	4		W	0 5			
	26	9	35	42		E		Slight		At top
	26	10	37	9		E	1	1		To violet at top, to red at base.
	26	9	41	5		E	1			At base
	26	9	41	4		E		2		Throughout the height of the prominence between +3° to 5° E.
	26	9	41	2		E	2	3		At the top most of part of the prominence whose base is between +3° to 5° E
	26	9	48		22	E	0 5			At top.
	26	9	48		25	E		1		Do
	26	10	54		60	E		1		On a floating speck.
	26	9	9	13		W		0 5		At top



The western hemisphere shows a slight preponderance over the eastern in areas, the percentage east being 49·68; in numbers the percentage east is 50·71.

Thanks are due to the co-operating observatories for the photographs supplied by them.

THE OBSERVATORY, KODAIKANAL,
23rd August 1928.

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