XII. "On a tendency observed in Sun-spots to change alternately from the one Solar Hemisphere to the other." By Warren De La Rue, D.C.L., F.R.S., Balfour Stewart, LL.D., F.R.S., and Benjamin Loewy, F.R.A.S. Received June 12, 1873.

1. Hitherto in our reductions we have summed up the spotted areas of the various groups occurring on the sun's surface on any day, and have regarded their sum as a representation of the spot-activity for that day. It has occurred to us to see what result we should obtain by taking instead for each day the excess of the spotted area in the one solar hemisphere above that in the other.

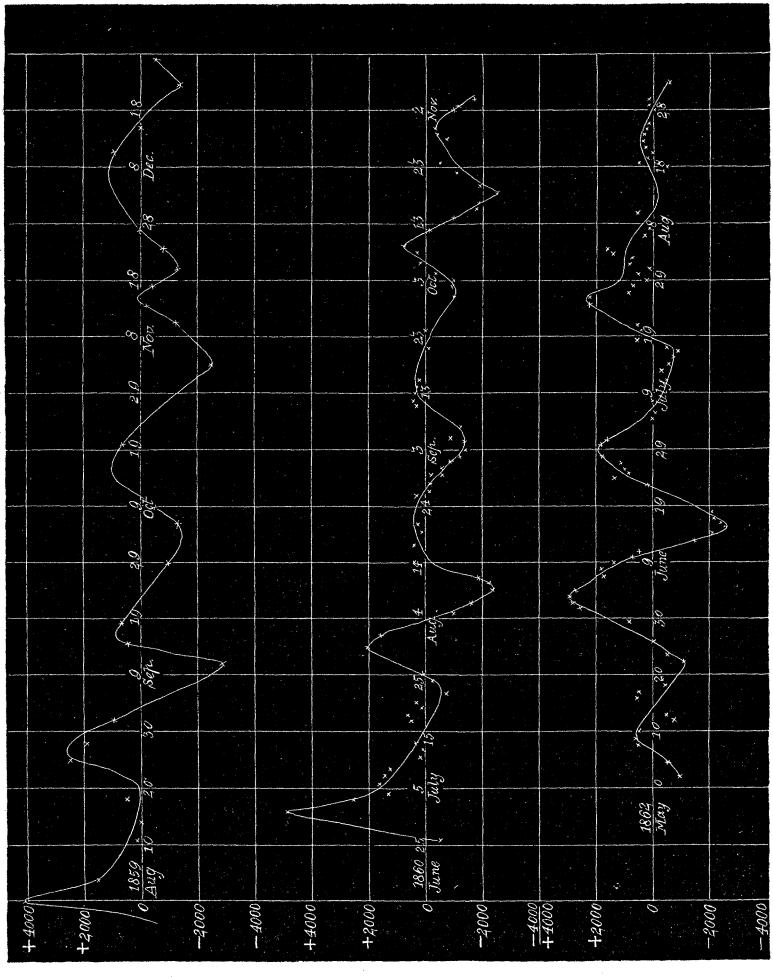
2. On adopting this method, it soon became evident that during periods of great disturbance there is a tendency in spots to change alternately from the north or positive to the south or negative hemisphere, and *vice versâ*, the period of such change being about 25 days. When, on the other hand, the solar disturbance is inconsiderable, the spots do not present any such systematic oscillation.

3. We have graphically represented on the annexed diagram the results derived from this method during three of the most considerable periods of solar disturbance.

In this diagram the observed values of hemispherical excess are marked with an asterisk, and a curve is drawn so as to equalize their smaller irregularities. The northern hemisphere is reckoned positive, and the southern negative. The unit of area is, as before, the one millionth of the sun's visible hemisphere.

4. The first of these three periods extends from the beginning of August to the end of December 1859. We derive from our diagram the following Table, exhibiting the maximum amounts of hemispherical excess, with their respective dates :—

Date.	Hemispherical excess. North.	South.
1859, July 31	+4180	
Aug. 18		(+ 40)
Aug. 27	+2580	
Sept. 11		−2920
Sept. 17	+ 920	
Oct. 3		−1420
Oct. 16	+1000	
Nov. 3		−2480
Nov. 15	+ 120	
Nov. 20		−1320
Dec. 7	+1050	
Dec. 22		−1400



From these we derive the following values of a period of oscillation, by taking the differences in dates between the positive extremes :—

27 days, 21 days, 29 days, 30 days, 22 days. Mean, 25·8 days ;

while doing the same with the negative extremes, we obtain

24 days, 22 days, 31 days, 17 days, 32 days. Mean, 25·2 days.

5. The second of the three periods extends from the end of June to the beginning of November 1860. Treating this in the same manner, we obtain :—

Date.	Hemispherical excess. North.	South.
1860, July 1	+4900	
July 22		— 600
July 30	+2040	
Aug. 9		—2400
Aug. 21	+ 400	
Sept. 5		—1400
Sept. 16	+ 400	
Oct. 1		—1180
Oct. 9	+ 800	
Oct. 19		—2560
Oct. 31	(— 380)	

From these we derive, by taking the differences in dates of the positive extremes,

29 days, 22 days, 26 days. 23 days, 22 days. Mean, 24·4 days;

while doing the same with the negative extremes, we obtain

18 days, 27 days, 26 days, 18 days. Mean, 22·25 days.

6. The third of these three periods extends from the beginning of May to the end of August 1862. Treating this in the same manner, we obtain:—

Date.	Hemispherical excess. North.	South.
1862, May 9	+ 600	
May 22		—1160
June 3	+2960	
June 15		—2600
June 29	+1880	
July 16		— 800
July 26	+2400	
Aug. 14		— 200
Aug. 23	+ 460	

Taking, as before, the distances between the positive extremes, we obtain

25 days, 26 days, 27 days, 28 days. Mean, 26·5 days;

while from the negative extremes we obtain

24 days, 31 days, 29 days. Mean, 28·0 days.

From the whole three periods we obtain, as the most probable mean value, 25·2 days.

7. We do not profess to have discovered the cause of these oscillations, but we would nevertheless suggest that the observational facts here brought to light may perhaps be connected with two other observational facts, the one of which was first brought to light by Carrington, and the other by ourselves.

The first of these is the fact that, generally speaking, spots in the north hemisphere have much about the same latitude as those occurring at the same, or nearly the same, period in the south, both sets widening or contracting together. We may perhaps, therefore, suppose, by applying this law, that the latitude of the spots which cause the positive extremes in the above series is not greatly different from that of those which cause the corresponding negative extremes.

The second observational law is that which tells us that spots about the same period have a tendency to attain their maximum at, or near, the same ecliptical longitude. Now, if we suppose that in the foregoing three series the greatest positive extremes were caused by the positive spots attaining their greatest size, and the greatest negative extremes by the negative spots attaining their greatest size, it would follow that the two sets, positive and negative, must have taken their rise at places on the sun's surface 180° of longitude different from each other, inasmuch as the one set about 12 or 13 days before, or after, passed (let us say) the same ecliptical longitude as the other.

But if the positive set have the same latitude as the negative, and if the one is 180° of solar longitude different from the other, it would mean that *the two outbreaks are at opposite ends of the same solar diameter.*

This conclusion is an interesting one; but, of course, it requires to be verified by further observation before it be finally received. Meanwhile we are engaged in mapping out systematically the positions of the various outbreaks upon the sun's surface, and we shall soon, therefore, be able to find whether or not there be any truth in this conjecture.

XIII. "On the Structure and Development of the Skull in the Pig (*Sus scrofa*)." By W. K. Parker, F.R.S. Received May 17, 1873.

(Abstract.)

I have for some years past determined to concentrate my attention on some one type of Mammalian Skull, so as to be able to present to the Royal Society a paper similar to those which have already appeared on other Vertebrate Skulls. I was led to work out this MEDIUM TYPE, and not a more generalized form, such as the Guineapig (see "On the Development of the Frog's Skull," Phil. Trans. 1871, p. 203), through the circumstance of an offer from my friend Mr. Charles Stewart to put some seventy embryos of the Common Pig into my possession. In the present communication I have had the invaluable help of advice and oversight from Professor Huxley; whilst the labour of my hands has been lightened by my son, Mr. T. J. Parker, who prepared for me all the more delicate sections. The embryos ranged in size from two thirds, or less, of an inch in length, with the head only equal in size to a *sweet pea*, whilst the head of the largest specimen was the size of that of the Common Squirrel. To these

+4000
+2000
0
1859
Aug
10
20
30
9
Sep.
19
29
9
Oct
19
29
8
Nov.
18
28
8
Dec.
18
−2000
−4000
+4000
+2000
0
1860
June
25
5
July
15
25
4
Aug.
14
24
3
Sept.
13
23
3
Oct.
13
23
2
Nov.
−2000
−4000
+4000
+2000
0
1862
May
0
10
20
30
9
June
19
29
9
July
19
29
8
Aug
18
28
−2000
−4000