namely, that the time between a minimum and the next maximum is less than that from the maximum to the next minimum.

Thus the times from the minimum to the maximum are for the three periods 3·06, 4·14, and 3·37, while those from the maximum to the minimum are 6·75, 8·44, and 7·44 years.

In all the three periods there are times of secondary maxima after the first maximum; and in order to exhibit this peculiarity, statistics are given of the light-curve of R Sagittæ and of β Lyræ, two variable stars which present peculiarities similar to the sun.

Finally, the results are tested to see whether they exhibit any trace of planetary influence; and for this purpose the conjunctions of Jupiter and Venus, of Venus and Mercury, of Jupiter and Mercury, as well as the varying distances of Mercury alone in its elliptical orbit, have been made use of, and the united effect is exhibited in the following Table, the unit of spotted area being one-millionth of the sun's visible hemisphere:—

Angular separation.	Excess or Deficiency.			
	Jupiter and Venus.	Venus and Mercury.	Mercury alone (Perihelion=0).	Mercury and Jupiter.
0 to 30	+ 881	+1675	− 380	−227
30 to 60	− 60	− 139	−1188	−317
60 to 90	− 452	−1665	−1287	−594
90 to 120	− 579	−2355	−1262	−714
120 to 150	− 705	−2318	−1208	−508
150 to 180	− 759	−1604	−1027	−491
180 to 210	− 893	− 481	− 519	−416
210 to 240	− 752	+ 547	+ 430	−189
240 to 270	− 263	+ 431	+1082	− 25
270 to 300	+ 70	+ 228	+1436	+154
300 to 330	+ 480	+1318	+1282	+164
330 to 0	+1134	+2283	+ 586	− 45

IV. "On the Contact of Conics with Surfaces." By William Spottiswoode, M.A., F.R.S. Received February 16, 1870.

(Abstract.)

It is well known that at every point of a surface two tangents, called principal tangents, may be drawn having three-pointic contact with the surface, *i. e.* having an intimacy exceeding by one degree that generally enjoyed by a straight line and a surface. The object of the present paper is to establish the corresponding theorem respecting tangent conics, viz. that "at every point of a surface ten conics may be drawn having six-pointic contact with the surface;" these may be called Principal Tangent Conics. In this investigation I have adopted a method analogous to that employed in my paper "On the Sextactic Points of a Plane Curve" (Phil.

Trans. vol. clv. p. 653); and as I there, in the case of three variables, introduced a set of three arbitrary constants in order to comprise a group of expressions in a single formula, so here, in the case of four variables, I introduce with the same view two sets of four arbitrary constants. If these constants be represented by $\alpha, \beta, \gamma, \delta, \alpha', \beta', \gamma', \delta'$, I consider the conic of five-pointic contact of a section of the surface made by the plane $\varpi - k\varpi' = 0$, where $\varpi = \alpha x + \beta y + \gamma z + \delta t$, and $\varpi' = \alpha' x + \beta' y + \gamma' z + \delta' t$, and k is indeterminate; and then proceed to determine k, and thereby the azimuth of the plane about the line $\varpi = 0$, $\varpi' = 0$, so that the contact may be six-pointic. The formulæ thence arising turn out to be strictly analogous to those belonging to the case of three variables, except that the arbitrary quantities cannot in general be divided out from the final expression. In fact, it is the presence of these quantities which enables us to determine the position of the plane of section, and the equation whereby this is effected proves to be of the degree 10 in $\varpi : \varpi' = k$, and besides this of the degree $12n - 27$ in the coordinates x, y, z, t (n being the degree of the surface), giving rise to the theorem above stated.

Beyond the question of the principal tangents, it has been shown by Clebsch and Salmon that on every surface U a curve may be drawn, at every point of which one of the principal tangents will have a four-pointic contact. And if n be the degree of U, that of the surface S intersecting U in the curve in question will be $11n - 24$. Further, it has been shown that at a finite number of points the contact will be five-pointic. The number of these points has not yet been completely determined; but Clebsch has shown (Crelle, vol. lviii. p. 93) that it does not exceed $n(11n - 24)(14n - 30)$. Similarly it appears that on every surface a curve may be drawn, at every point of which one of the principal tangent conics has a seven-pointic contact, and that at a finite number of points the contact will become eight-pointic. But into the discussion of these latter problems I do not propose to enter in the present communication.

March 17, 1870.

Capt. RICHARDS, R.N., Vice-President, in the Chair.

The following communications were read:—

I. "On the Law which regulates the Relative Magnitude of the Areas of the four Orifices of the Heart." By HERBERT DAVIES, M.D., F.R.C.P., Senior Physician to the London Hospital, and formerly Fellow of Queens' College, Cambridge. Communicated by W. H. FLOWER, Hunterian Professor of Comparative Anatomy. Received January 27, 1870.

I propose in this communication to inquire whether any law can be discovered which determines the relative magnitude of the areas of the