10.

NOTE ON ELIMINATION.

[*Philosophical Magazine*, XVII. (1840), pp. 379, 380.]

THE object of this brief note is to generalise Theorem 2 in my paper on Elimination* which appeared in the last December number of this *Magazine*. The theorem so generalised presents a symmetry which before was wanting. Here, as in so many other instances, the whole occupies in the memory a *less* space than the part.

To avoid the ill-looking and slippery negative symbols, I warn my reader that I now use two rows of quantities written one over the other, to denote the product of the terms resulting from *taking away* each quantity in the under from each in the upper row.

Let $h_1, h_2 \dots h_m$ be the roots of one equation of coexistence,

$k_1, k_2 \dots k_n$ of the other,

and let the prime derivative of the degree r be required. Take *any* two integers p and q, such that $p+q=r$. The derivative in question may be written

$$\Sigma\left\{(x-h_1)\dots(x-h_p)(x-k_1)\dots(x-k_q)\frac{\begin{pmatrix}h_1h_2\dots h_p\\ k_1k_2\dots k_q\end{pmatrix}\cdot\begin{pmatrix}h_{p+1}h_{p+2}\dots h_m\\ k_{q+1}k_{q+2}\dots k_n\end{pmatrix}}{\begin{pmatrix}h_1 & h_2 & \dots h_p\\ h_{p+1} & h_{p+2} & \dots h_m\end{pmatrix}\cdot\begin{pmatrix}k_1 & k_2 & \dots k_q\\ k_{q+1} & k_{q+2} & \dots k_n\end{pmatrix}}\right\}.$$

N.B. Whatever p and q be taken, so long only as $p+q=r$, the above expression changes nothing but its sign; which, therefore, upon transcendental grounds, it is easy to see is of one name or another, according as p is odd or even.

In the original paper, I asserted this theorem only for the case of $p=0$, or $q=0$.

[* p. 43 above. ED.]