5.

ON AN EXTENSION OF SIR JOHN WILSON'S THEOREM TO ALL NUMBERS WHATEVER.

[*Philosophical Magazine*, XIII. (1838), p. 454.]

THE annexed original theorem in numbers will serve as a pendant to the elegant discovery announced by the ever-to-be-lamented and commemorated Horner*, with his dying voice, in your valued pages†.

THEOREM.

If N be any number whatever and

$$p_1, p_2, p_3 \ldots\ldots p_c$$

be all the numbers less than N and prime to it, then either

$$p_1 \cdot p_2 \cdot p_3 \ldots\ldots p_c + 1,$$

or else

$$p_1 \cdot p_2 \cdot p_3 \ldots\ldots p_c - 1,$$

is a multiple of N.

6.

NOTE TO THE FOREGOING.

[*Philosophical Magazine*, XIV. (1839), pp. 47, 48.]

I HAVE to apologize for calling "original" (in the last Number of the *Magazine*) the theorem of numbers which I termed "a pendant to Horner's theorem." This Mr Ivory has done me the honour to inform me may be found in Gauss's *Disquisitiones Arithmeticæ*, p. 76. As Horner's extension of Fermat's theorem suggested this extension of Sir John Wilson's to me, so I concluded that had this extension of Wilson's been known to the world it would naturally have suggested his to Horner. No acknowledgment of this kind having been made, I took it for granted that the theorem I gave was new. Undoubtedly had Mr Horner been aware of Gauss's theorem he would have made mention of it.

I take this opportunity of adding that my acquaintance with Gauss's principle‡ has not been derived from the study of his works, but from a casual statement of it in an English work, *Dynamics*, by Mr Earnshaw, of St John's College, Cambridge.

* Horner's proof is highly valuable as a novel and highly ingenious form of reasoning, but his theorem may be deduced with infinitely more ease and brevity from Fermat's than he seems to have been aware of.

[† *Phil. Mag.* Vol. XI. p. 456. ED.]

[‡ See p. 28 above. ED.]