

## ON BRIGGS'S FORMULA FOR INTERPOLATION.

To the Editor of the Assurance Magazine.

Sir,—I read with very great interest the translation given in vol. xiv., p. 73, of Briggs's process of interpolation, and have to thank you and Mr. Williams for directing attention to an author and a method which had been almost entirely forgotten. It appears to me that Briggs's method is not only theoretically interesting, but that it may in calculating a table of successive values of a function prove practically useful, and possibly be found superior to any of the methods recommended by modern authors.

The law which the multipliers used in the process follow is not stated by Briggs, and is not obvious at first sight. After a few trials, I ascertained that it is as follows:—Referring to the Table X., on p. 79, I extract the following line—

$$8 \parallel 8(10) | 29\cdot6(12) | 67\cdot2(14) | 104\cdot72(16) | 118\ 72(18) | 101\cdot248(20)$$

Here the coefficients are

$$8 \quad 29\cdot6 \quad 67\cdot2 \quad 104\cdot72 \quad 118\cdot72 \quad 101\cdot248,$$

and it will be found that these are the coefficients of  $x$ ,  $x^2$ ,  $x^3$ ,  $x^4$ ,  $x^5$ , and  $x^6$ , in the expansion of  $(1+x+2x^2)^3$ ; and, in general, that for any index  $n$ , the coefficients are those of  $x$ ,  $x^2$ ,  $x^3$ , . . . . ., in the expansion of  $(1+x+2x^2)^n$ . Briggs supposes, in his example, that all the differences after the 20th may be neglected, and therefore gives only the coefficients necessary for this case; but if higher differences are taken into account, then for indices greater than 4, other terms must be added to those given in his Table X.; and the coefficients of these terms, as well as the whole series of coefficients for indices greater than 18, may be found by the above rule.

In verifying this rule, I found that for the index 5, the coefficient of (19) should be .560, but it is printed in the *Journal* as .500. This led me to refer to the copy of Briggs's *Arithmetica Logarithmica*, in the Royal Library at Copenhagen, and I then found that your misprint, if indeed it may be called such, is very excusable. For, knowing that the coefficient ought to be .560, I was able to see that the head of the 6 had been broken off; but if I had not had that knowledge, I should certainly have read it, as Mr. Williams has done, as 0. In the *Trigonometria Britannica*, p. 38, the figure is printed correctly.

There is a second misprint in the table X., as printed in the *Journal*, which was discovered by Mr. Sprague, while assisting me in the composition of this letter. The coefficient of (20), which is given correctly above as 101·248, is printed as 111·248 in Mr. Williams's translation.

I am, Sir,  
Your obedient servant,

LUDVIG OPPERMANN.

London, 28th December, 1869.