CORRESPONDENCE.

ON A STATEMENT REVIVED IN MR. HODGE'S PAPER ON INTEREST, WITH REFERENCE TO THE AUTHORSHIP OF GRAUNT'S OBSERVATIONS.

To the Editor of the Assurance Magazine.

DEAR SIR,—When your last Number reached me, I was engaged in searching Capt. John Graunt's *Observations on the Bills of Mortality*, with a view to get some information on the *rising of the lights*, as to what it meant: those who read *Notes and Queries* will see why. A contributor to that Journal mentions a poor woman who told him she had had an attack of that disorder, but she "keeped 'em down" with a *dose of shot*. Looking over your pages, I was seized with symptoms of the character described, on finding that Mr. Hodge, in his very able and elaborate paper on Interest, has revived the old story that Sir William Petty wrote Graunt's *Observations*. Fortunately, I had the remedy by me. I immediately took a dose of *Biographia Britannica*, a work which is, one page with another, much heavier than any shot, even had such globules been at hand.

The work just mentioned disposes of the assertion made by Burnet. Sir William Petty himself, in scores of places, refers to Graunt's work as Graunt's; and Petty himself, after Graunt's death, published an edition of Graunt's work, *as Graunt's*. To this edition he sometimes carelessly refers as to a work of his own, as editors will occasionally do: and this, with an insinuation of Anthony à-Wood, and a statement of Burnet, form the printed foundation of the story which, to my mind, the *Biographia Britannica* completely disposes of.

During the years immediately preceding the publication (1661) of Graunt's work, Sir William Petty was in office in Ireland, in Parliament, under impeachment, in retirement in Ireland, and, after the Restoration, in the Commission of Claims, a well-occupied body, we may be sure. That he could have helped Graunt while at work is as unlikely as that he—a political arithmetician above all things—should choose to publish a work of much labour and no offence under the name of another. They were close friends, and in early life Graunt was Petty's patron, and Petty may have suggested the inquiry, and may have discussed its conduct. Graunt was notorious as the author, and was chosen into the Royal Society in consequence: and the King, understanding that there was a hitch in the matter, on account of Graunt being in trade, signified to the Royal Society that if they found any more such tradesmen they should elect them 'without more ado.' This distinction, added to Graunt being a Papist, probably induced some ill-willers, who thought that Petty's intimacy would give the thing a face, to circulate the story which came to the ears of Burnet and Anthony à-Wood. The best proof that Petty did not write the book is the difference of style, knowledge, and opinion between the book itself, and the works published under Petty's name. Graunt differs from Petty in political economy, in several points; and, as to knowledge, Graunt *attributes the effect of the tremors of the telescope to the actual motion of the moon in her orbit.* He makes her go forwards and then start backwards a little,

like the hand of a clock, or a boat which is rowed by impulses. Would Petty, who was a competent mathematician, who lived among the astronomers, and who was himself an inventor of machines, have conceived this exquisite bit of knowledge; or, conceiving it, would he have published it at the very time when, owing to the meetings of the Royal Society (of which he was one of the first members of council) he was in almost daily communication with those who would have set him right? Either supposition is hardly possible.

Yours faithfully,

January 17*th*, 1859. A. DE MORGAN.

ON THE INCONGRUITY EXISTING BETWEEN THE RATES OF PREMIUM CHARGED AT CERTAIN AGES AND THE BENEFITS ACCRUING THEREUNDER.

To the Editor of the Assurance Magazine.

SIR,—I should like to bring under your review a matter that I think hardly meets with the consideration it deserves among actuaries—viz., the incongruity that exists between the premiums charged at different ages on "bonus" policies, and the benefits to which they entitle the holder, where, as in the great majority of cases, these premiums are calculated with reference only to the principal sum assured, and the reversionary "bonus" is declared by annual additions which are periodically "vested" or added to the principal amount, forming the capital which determines the amount of bonus for the next succeeding period.

Where the bonus is at the rate of P per £1 per annum, computed at each period of t years, its progress may be stated thus:—

First period.

Sum assured	£1.
Annual bonus	$P=B_1$.

Second period.

Sum assured	$1+tP$.
Annual bonus	$P(1+tP)=B_2$.

Third period.

Sum assured	$(1+tP)+tP(1+tP)=(1+tP)^2$.
Annual bonus	$P(1+tP)^2=B_3$, &c.

Allowing for the altered circumstance of the addition being made to the sum assured after the first term has elapsed, the identity of the above formula for it with that for the amount of £1, is obvious—the sum assured for the nth period being $(1+tP)^{n-1}$,
and the annual bonus $P(1+tP)^{n-1}=B_n$.

By the ordinary commutation tables, the annual premium for such a benefit, at age x, is

$$\frac{M_x+B_1R_x+(B_2-B_1)R_{x+t}+(B_3-B_2)R_{x+2t}+\ \ldots\ \text{&c.}}{N_{x-1}}.$$

I send you the following results of this formula, deduced from the Carlisle 3 per Cent. Table, assuming the sum under the policy to be

https://doi.org/10.1017/S2046165800001076 Published online by Cambridge University Press