CORRESPONDENCE.

ON THE DESIRABLENESS OF AVAILING OURSELVES OF THE BEST EXISTING DATA, WHEN SUCH AS ARE PERFECT CANNOT BE OBTAINED.

To the Editors of the Assurance Magazine.

GENTLEMEN,—I beg to offer a few remarks in reference to the paper, in the last Number of your Magazine, on the Theories of Combinations, Probabilities, &c., by Mr. Hardy.

If I were to allow myself to indulge in the pleasing task of eulogizing, I would pay a high and well-merited compliment to the author of that paper; but my object is merely to suggest a few additional " Considerations" to those so ably brought forward by Mr. Hardy, and to point out some of the duties of an actuary that do not seem to fall under the distinctive characters of his probabilities.

The duty of an actuary frequently calls for the exercise of his talents in cases where the data on which his conclusions must rest are neither "EXHAUSTIVE" nor "EXCLUSIVE;" and were he to abstain from making the most he can out of the elements which may be within his reach, and refuse to risk his professional reputation, unless he could command the full information which might be necessary to exhaust his subject, the basis of future improvement would often be lost, and another generation might have come in our place before a properly-registered experience would furnish the needful materials. This is every day seen in the discoveries of useful arts, where the inventive genius of the patentee is entirely thrown into the shade by the successful skill of those who, without the merit of originality, improve upon the design, and, too often, carry off all the reward.

I shall illustrate what I mean by the example adduced by Mr. Hardy. Two observations, taken from two chronometers of equal reputation for correctness, are referred to as the data from which an actuary is called upon to determine at what particular moment a certain event took place. According to one of these, the hour was 11·50; while, by the other, it was 12·10. The discrepancy, being 20 minutes, points to the exact hour of 12 as the medium; and, no other means of arriving at the truth being before him, or within his reach, the actuary feels himself called upon to give the average as the Q. E. D. He must, however, come to this decision with a strong conviction in his mind that he is very likely to be wrong. That two correct watches should have each made such a deviation from the true time, is more unlikely than that one only should have gone wrong; and that each should have made exactly the same deviation in opposite directions, is more unlikely still. On this point I must differ from Mr. Hardy; for I cannot help thinking, that the conclusion adopted by the actuary, in fixing 12 as the true time, was not the most likely thing to be correct; but he might console himself by thinking, that the amount of error involved in that conclusion was less than it would be on any other supposition. I quite agree with Mr. Hardy in his conclusion, for the actuary could come

to no other result, seeing that he has no means of increasing the data, or testing the truth. No doubt, an actuary might say, that he could give no opinion on such insufficient data, and so save himself from the charge of having given an erroneous decision; but the object of my remarks is to point out, that numerous instances occur in which actuaries not only may, but ought to act on very imperfect data; not, indeed, with the view of establishing their own individual character for accuracy, but with the far higher aim of promoting the advancement of science, by giving the best foundation they can from which to proceed when additional information shall have been obtained.

I shall take the opportunity of explaining the object of these remarks, by referring to another paper in the same Number of your Magazine.

The subject of Extra Rates for Foreign Climates has hitherto been confessedly one in which the Offices have had nothing like established principles to guide them; and it is probably the general opinion, that we have at present no data that can be held at all sufficient for the construction of a correct table of such rates. But it is not less the duty of the actuary to take the materials he has, and to make the best use he can of them, thereby forming a rule for his guidance at present, besides contributing a most valuable item in any future investigations. To proceed upon defective and insufficient data, and to give forth the result as a final and certain truth, must be held as indicating a want of candour or discrimination; but to produce from the best materials that are extant the natural deductions which these are fitted to afford, and to admit the deficiency and imperfection which may attach to them, is a work deserving of the highest commendation and encouragement. The actuary who would refuse to assist in such an attempt, because his labour might afterwards be condemned as erroneous, must have a greater desire to establish his own reputation for correctness, than to aid in the promotion of science. It may be averred, without fear of contradiction, that the most useful labours of any actuary who aspires to the dignified name of a philosopher, must be exercised in the field of unexplored truths, where perhaps a distant approximation to what shall ultimately be discovered is all that can be arrived at; and yet that distant approximation may be the means of establishing many most valuable and important propositions which might otherwise remain unsolved.

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ON THE VALUE OF ISOLATED REVERSIONS.

To the Editors of the Assurance Magazine.

GENTLEMEN,—In Mr. Jellicoe's very useful paper on the Purchase of Life Interests and Reversions, the methods of making this sort of property return a certain rate of interest not dependent on the duration of the annuitant's or the reversionee's life are clearly pointed out, and it seems to me that the principles therein developed can be satisfactorily applied in the majority of cases that arise. But the formula for finding the purchase-money for £1, payable at A's death, cannot be well adopted always. It is $s = (1 - Ar)\,v$, where s is the sum to be received by the seller, A the price of an annuity of £1 on the life, and r and v respectively the annual interest on, and the present value at the end of a year of, £1, at the rate of interest which the

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