deferred reversion as above is lessened by the value of the survivorship payable if a life n years older than A dies in the lifetime of B, multiplied into the value of £1 payable if A lives n years; hence the true value is equal to

$$\left(\mathrm{A}_n\mathrm{I}\mathring{\mathrm{i}} - \overline{\underset{\mathrm{I}}{\mathrm{A}}_n\mathrm{B}}^{\,1}\,\mathrm{I}\mathring{\mathrm{i}}\right)\frac{a_n}{ar^n}.$$

Problem II.—To determine the present value of a reversion of £1 payable on the death of A, provided he dies before another life, B, or *within* n years after him.

Solution.—The value of this contingent reversion is manifestly very nearly equal to the value of an absolute reversion on the single life of A, as the assurance will not be paid only in the event of his surviving B by at least n years, as in the foregoing problem. Consequently

$$\mathrm{A}\mathrm{I}\mathring{\mathrm{i}} - \frac{a_n}{ar^n}\left(\mathrm{A}_n\mathrm{I}\mathring{\mathrm{i}} - \overline{\underset{\mathrm{I}}{\mathrm{A}}_n\mathrm{B}}^{\,1}\,\mathrm{I}\mathring{\mathrm{i}}\right)$$

will be equal to the required value,

$$\mathrm{A}\mathrm{I}\mathring{\mathrm{i}} - \frac{a_n}{ar^n}\left(\mathrm{A}_n\mathrm{I}\mathring{\mathrm{i}}\right) + \frac{a_n}{ar^n}\left(\overline{\underset{\mathrm{I}}{\mathrm{A}}_n\mathrm{B}}^{\,1}\,\mathrm{I}\mathring{\mathrm{i}}\right);$$

and since

$$\mathrm{A}\mathrm{I}\mathring{\mathrm{i}} - \frac{a_n}{ar^n}\left(\mathrm{A}_n\mathrm{I}\mathring{\mathrm{i}}\right) = \overline{\underset{\mathrm{I}}{\mathrm{A}}n}^{\,1}\,\mathrm{I}\mathring{\mathrm{i}}$$

equals the value of a temporary reversion or assurance on the life of A, it is obvious that the value of the contingent reversion required by the problem will be

$$\overline{\underset{\mathrm{I}}{\mathrm{A}}n}^{\,1}\,\mathrm{I}\mathring{\mathrm{i}} + \left(\overline{\underset{\mathrm{I}}{\mathrm{A}}_n\mathrm{B}}^{\,1}\,\mathrm{I}\mathring{\mathrm{i}}\right)\frac{a_n}{ar^n}.$$

Q. E. D.

The rule in words at length will consequently be—"To the value of a temporary assurance on the life of A, add the value of a reversion contingent on B surviving a life n years older than A, multiplied into the present value of £1 payable if A lives n years."

ON A NEW EXPRESSION FOR THE VALUE OF THE ANNUAL PREMIUM FOR A LIFE ASSURANCE.

To the Editors of the Assurance Magazine.

Gentlemen,—In your last Number, p. 332, the very striking analogy was pointed out which subsists between a whole life assurance, and an assurance which is certainly payable at a specified age if it have not before become due. I may perhaps be pardoned for stating that this analogy had been previously shown by me, in proof of which I beg to refer you to "Tables and Formulæ for the Computation of Life Contingencies," p. 95, Corollary.

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I am satisfied that a good many curious if not useful relations amongst different benefits remain yet to be shown. *E. g.*:—To express the annual premium for a life assurance in terms of the single premium.

If a denote the present value of the annuity, and A that of the assurance, we have

$$A = v - (1 - v) a;$$

whence

$$a = \frac{v - A}{1 - v}, \text{ and } 1 + a = \frac{1 - A}{1 - v}.$$

Now the annual premium is equal to

$$\frac{1 - (1 - v)(1 + a)}{1 + a};$$

in which, substituting for $1 + a$ its value as found above, we have for the annual premium

$$\frac{A(1 - v)}{1 - A},$$

a very compact expression.

I am, Gentlemen,

Baker Street, Lloyd Square, Your most obedient servant,

19 *Sept.*, 1851. P. GRAY.

[NOTE.—We owe our able correspondent an apology: on turning to his work we find the fact to be as he states it. The corollary in question had entirely escaped our observation.—*Ed. A. M.*]