MR. PETER GRAY'S DEMONSTRATION OF FORMULÆ.

To the Editor of the Assurance Magazine.

Sir,—The demonstration of the expressions for the values of single and annual premiums given by Mr. P. Gray (No. XLVIII., page 238, of the *Assurance Magazine*) is quite new and remarkable indeed, but yet it affords us a greater interest, if we suppose, for the sake of generalization, the consideration for forbearance *in infinitum*, we have

$$A_x=(1-v)a'_x(A_x+A_x^2+A_x^3\ldots.) \quad . \quad . \quad . \quad (I.)$$

which, as is known, is equal to

$$(1-v)a'_x\cdot\frac{A_x}{1-A_x},$$

and thus the expression for the present value will become

$$A_x=1-(1-v)a'_x.$$

Hence, dividing the foregoing formula (I.), by a'_x, we obtain immediately the annual premium

$$\pi_x=(1-v)(A_x+A_x^2+A_x^3+\ldots),$$

which is equal to the expression

$$\pi_x=\frac{(1-v)A_x}{1-A_x}.$$

I have the honour to be,
Sir,
Your most obedient servant,

D. AUGUST WIEGARD,
Director of Life Assurance Society "Iduna."

Halle a/S. Prussia, Germany,
23rd August, 1862.

ON INCREASING AND DECREASING SCALES OF PREMIUM.

To the Editor of the Assurance Magazine.

Sir,—The following lines may have an interest for some of the junior members of the Institute, and that is the only reason for my venturing to address you upon a subject so simple as that of determining a premium, ascending or descending by a series of stages, for a whole-term life assurance.

In practice I have met with five varieties of this form of payment, viz.:—

1st. The premium to be p for the first stage, and to be increased or decreased so as to be $p\pm q$ (q being a quantity previously determined) for the second stage, $p\pm 2q$ for the third stage . . . and $p\pm(v-1)q$ for the vth stage, at which it is to remain constant for the remainder of life; to find the value of p.

2nd. The premium for the first stage to be p (p being determined), for the second stage $p\pm q$ (q being arbitrarily fixed), for the third stage $p\pm 2q$, &c., and for the vth stage $p\pm q'$, at which it is to remain constant; to find the value of q'.