

CORRESPONDENCE.

 ON THE METHOD OF INTERPOLATING THE VALUES OF
 PREMIUMS WHEN THESE ARE
 GIVEN ONLY FOR CERTAIN INTERVALS OF AGE.

To the Editor of the Journal of the Institute of Actuaries.

SIR,—On reading the communication from Mr. Samot in the October number of the *Journal*, upon the “Method of Interpolating the Values of Premiums for Endowments and Endowment Assurances”, it at once occurred to me that the method described by him as the “most common practical method”,—and which he shows to lead, in some instances, to very inaccurate results,—could hardly be one which is ever used in reality. The following is that which, it seems to me, would most naturally occur to any one under the circumstances; and it will be seen that in every instance it gives

results even more accurate than those arrived at by Mr. Samot, and with a considerably less expenditure of labour.

To take Mr. Samot's first example: let the annual premium be required for an endowment assurance of 100, payable at 64, on a life now aged 55. The calculation will stand as follows:—

Prem. for 56-65, from Hardy's book	=	10·197
" 51-60, " " "	=	9·815
		5) 382
		·076
		10·197
		10·121
Prem. for 55-64, " " "	=	10·121

On working out his other examples as well, the results given in the following table will be obtained; and it will be observed that, in most cases, they are remarkably close to the true premiums:—

Ages.	ANNUAL PREMIUM.			ERROR.	
	Mr. Samot's Method.	Method now proposed.	True.	Mr. Samot's Method.	Method now proposed.
55-64	10·14	10·121	10·103	·037	·018
55-61	15·33	15·298	15·283	·047	·015
42-47	18·01	17·976	17·961	·049	·015
30-52	3·22	3·215	3·213	·007	·002
25-48	2·97	2·967	2·961	·009	·006

It may further be remarked that, if Orchard's tables are at hand, we can obtain the *exact* premium, with even less trouble than is involved in the use of the approximate method I have just indicated; for—to refer again to the first of the above examples—all that is necessary is to find, from Hardy's tables, $_{18}a_{55} = 5·940$, and the annual premium corresponding to this annuity is, by Orchard's tables, at once found to be 10·103.

I may also point out that the method of interpolation here proposed, admits of being usefully employed when it is desired to determine the proper premium to be charged by an office when a person taking out an endowment assurance policy is to be rated-up to an age higher than his actual age. For instance, let the age of the life in question be 30, and the age at which the assurance is to be payable 50; then, if he is taken at 5 years' advance, the proper premium to charge will be the tabular rate for age 35, payable at 55; but if he be taken at *two* years' advance, then we must charge the rate for 32, payable at 52, which will be found by interpolating in the manner above described between 30-50 and 35-55, taking the premiums in each case from the office tables of rates. When, as is often the case, the loading does not consist entirely of a percentage on the net premium, this method will be found more expeditious than if we first found the net premium by Hardy's and Orchard's tables,

and then added the requisite loading; and, moreover, it admits of being employed in the absence of any tables other than those contained in the prospectus of the office.

I am,

Yours, &c.,

Australian Mutual Provident Society,

Sydney, N.S.W.,

10th Jan. 1878.

D. CARMENT.
