

CORRESPONDENCE.

MR. GRAY'S METHODS OF CONSTRUCTING LIFE TABLES.

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

SIR,—In Professor Pell's Note on the Construction of Commutation Tables (*Journal*, vol. xxi, page 275), the following passage occurs :—

"I have carefully considered the methods adopted by Mr. Peter Gray in forming the Institute of Actuaries' Tables; and although the formulas made use of are ingenious, and their use may be attended with some advantages, I cannot think that there can be anything in them to counterbalance the comparative ease and simplicity of the method which consists in the direct application of the formulas which express the values of the quantities to be found."

Mr. Gray, in the preface to his remarkable work, *Tables and Formulæ for the Computation of Life Contingencies*, says that it "claims to afford greater facilities for the formation of tables of life contingencies than have hitherto been at the command of the computer."

This claim, I believe, was, and still is, a just one. Passing over much that is both ingenious and original, I confine myself to life annuities.

For the computation of these, Mr. Gray did not offer a new formula. He took Simpson's (or De Moivre's) famous formula, and gave the means of using it with advantage. What had been laborious, was made easy; and so far from being indirect, the process is perhaps the most direct that can be devised.

Then, as to the commutation system, Mr. Gray, still following the principle of "deducing each value from that of the next older life" (these are Simpson's words), gives the most fertile method that has ever come under my notice. He shows (Prob. xxii) how to obtain by a single operation, from the logarithms of D_x , those of N_x , a_x , and $1 + a_x$,—no other quantities appearing in the process.

I have had more than common experience in annuity calculations, and I have tried many ways; but I know of none superior, or indeed equal to that first mentioned. Annexed is a specimen that will bear comparison with Professor Pell's results, this being of the two the more correct.

Gray's book will surely continue to hold its place as a standard work. It should be in the hands of all who desire to excel in the practical computation of money risks depending on life contingencies.

I am, Sir,

Yours faithfully,

London, 24 June 1879.

J. C. HANNYNGTON.

Males, New South Wales, Annuities, 4 per cent.

	x		$\log \frac{a}{a}$	x		$\log \frac{a}{a}$	x		$\log \frac{a}{a}$
N	104	3̄854752		96	475761		88	080211	
D	1 + a {	2̄190757	1̄663815	337971	137790	724720	355491		
		164681	0̄4611	375315	1̄3734	514113	2̄2672		
		5		52		64			
	103	355443		95	713338		87	238897	
{		510425	845018	547421	165917	857200	381697		
		230409	0̄6999	391854	1̄4653	532460	2̄4082		
		7		10		68			
	102	740841		94	939285		86	389728	
{		814225	926616	745578	193707	982038	407690		
		265879	0̄8445	408591	1̄5621	550990	2̄5568		
		7		4		65			
	101	080111		93	154173		85	533093	
{		102794	977317	932952	221221	099375	433718		
		289828	0̄9491	425663	1̄6643	569908	2̄7147		
		8		13		13			
	100	392630		92	358628		84	669296	
{		376737	015893	110033	248595	210126	459170		
		309002	1̄0373	442816	1̄7726	588615	2̄8785		
		47		61		52			
	99	685786		91	552910		83	798793	
{		636659	049127	277295	275615	314395	484398		
		326274	1̄1198	460344	1̄8863	607455	3̄0507		
		14		10		74			
	98	962947		90	737649		82	921924	
{		883131	079816	435198	302451	412549	509375		
		342760	1̄2018	478035	2̄0066	626415	3̄2313		
		9		34		57			
	97	225900		89	913267		81	039021	
{		116719	109181	584194	329073	504940	534081		
		358997	1̄2858	495967	2̄1334	645402	3̄4204		
		45		50		62			
	96	475761		88	080211		80	150404	
						591903	558501		
							3̄6183		

