of errors who may take the trouble to compare the same with my book, and shall gladly send him a copy for the first notice of each error. The second part of my work is quite independent of and has not yet been compared with any other table.

EDWARD SANG.

In a letter to Mr. Peter Gray, dated 7 Oct. 1872, Mr. Glaisher says, "I have no doubt Professor Whitcom did not claim to have found out the error in log 52943 himself, but obtained it (as I did that in log 38962) by comparison with Vega." He further mentions that Bruhns gives log 52943 correct, and that Hülsse's edition of Vega, 1840, has log 52943 *wrong*, altho' the previous editions have it right: also, that Dr. Bremiker in the preface to his 41st edition traces Babbage's error in log 52943 to Gardiner.

[In connection with this subject we may mention that our next Number will contain an article by Mr. Glaisher on "Errors in Tables of Logarithms of Numbers," being an abstract of a paper lately read by him before the Royal Astronomical Society.—ED. *J. I. A.*]

AMERICAN TEN-YEAR NONFORFEITURE POLICIES.

To the Editor of the Assurance Magazine.

SIR,—I send for publication, as likely to interest your readers, a statement of certain serious objections to the anomalous contract known in America as the Ten-Year Nonforfeiture Life Policy. These objections, always held and consistently acted upon by a few, have at last come to be widely recognized. The alteration of opinion has been manifested practically within a year or two past by changes in the plans of business of three, at least, of the largest companies.

A life policy calling for the payment of a limited number of annual premiums, is, of course, no novelty. Every writer on life contingencies furnishes, explicitly or implicitly, formulæ proper to be used in such cases. Secured contracts of this sort, forming an intermediate class between paid-up policies and those at annual premiums, are, in themselves, unobjectionable; presenting, apparently, no disadvantages which are not shared by one or other of those more usual forms of policy. By "secured contracts," I mean those which provide for forfeiture in case of lapse, or for such other penalty as will indemnify the society for whatever loss it may sustain by the default. Of this class are the ten-premium policies (now) written by some of the American companies, which promise the issue, in case of lapse, of a paid-up policy for "an equitable sum," to be determined by the company. This equitable sum, it must be presumed, is to be ascertained by making the present value of all liabilities on the new policy equal to that of those on the old, less proper damages for the breaking of the contract. Policies of this class, under which the society is, except in case of death, certain to receive all the premiums contemplated, or else a proper amount of profit-money out of the reserve value, may, for convenience, be called *secured ten-premium policies.*

A second variety of ten-premium policy was brought out some years ago by a prominent American company. At age 30, for example, one could pay $45·83 for a paid-up policy of $100, with the privilege of taking another similar policy at the same price the following year, if desired, and so on, not exceeding ten years in all. (In practice, I believe, the first year's policy was so phrased as to cover the whole term, but the effect was as described—insuring $100 the first year, $200 the second, and so on.) This scheme seems to have come to grief speedily. Mr. Wright, in his report for 1864, remarks of it that it had, up to date, "tempted only one person."

A third and more attractive plan may be described as follows:—The first year's payment secures a paid-up policy for $100, *plus* a temporary assurance of $900 for the year. The next year, if the policyholder is inclined to go on, which he is permitted to do without re-examination, another payment secures $100 more, paid-up, and $800 temporary; the third year, if desired, an additional payment secures $100 more, paid-up, and $700 temporary; and so on for ten years. For distinction, I will call this the *ten-policy plan.* It seems to be embodied, with variations, in the prospectus of a new English company.

Ignoring for the present the injurious effects of the successive options allowed, let us see what premiums should be required for the benefits just described, beginning, for example, at age 50. The net premiums (Actuaries' or Old Experience, 4 per cent.) would be as follows:—

Year.	Age.	Premium on 100 dollars paid-up.	Premium on Temporary Assurance.	Total Net Premium.
1	50	48·19	13·79	61·98
2	51	49·31	13·00	62·31
3	52	50·45	12·08	62·53
4	53	51·60	11·02	62·62
5	54	52·76	9·77	62·53
6	55	53·93	8·33	62·26
7	56	55·12	6·67	61·79
8	57	56·31	4·75	61·06
9	58	57·51	2·54	60·05
10	59	58·73	0·00	58·73

These premiums are irregular, and cannot be reduced to uniformity; for equalization of premiums is not allowable when it puts the company out of pocket. If we attempt to find the uniform annual premium equivalent to this series, by dividing the sum of the present values of the natural premiums by the temporary annuity-due, we get $61·74, which is less by $0·24 than the sum required for the first year's risk alone. The net premiums required by the ten-policy plan are necessarily irregular, and this fact must be borne in mind by any one desiring to carry out that plan on scientific principles. Reserves, surrender values, and bonuses, must all be computed with express reference to this stubborn fact. Moreover, the commission to agents must be determined with due regard to the uncertainty attending the payment of the second and subsequent premiums. The agent must, indeed, be paid separately for each of the ten premiums, as being, in fact, "single premiums" on ten different policies.

All these matters, however important, are still subordinate to the main question—Are such options safe? In theory they certainly are not. The opportunity afforded, for a term of years, to choose a larger or smaller amount of insurance, without re-examination, and without forfeiture or penalty of any sort in case the smaller amount is chosen, is so manifestly detrimental to the interests of the company granting it, that, before your readers at least, the subject need not be argued. The conclusions of a sound theory are not to be overthrown by any amount of apparently countervailing experience, so long as the testimony is merely negative, and no crucial case has arisen. Many thousands of policies too closely resembling those in question are now in force in America—above ten thousand in my own company alone—and no particular damage is traceable to the effects of the gratuitous options afforded under them. It would seem that such options do no great harm, on the whole, so long as the company granting them continues prosperous, and bonuses abound. *Poverty* probably causes as many bad lives, in proportion, to lapse as good. *Distrust* would operate chiefly among the best lives. A company doing a large business on what I have called the ten-policy plan, and becoming distressed while most of its policyholders had still several premiums to pay, would speedily find none but the very ignorant or the very sick continuing to avail themselves of the liberal options afforded to all.

The kind of policy to which I have just referred as being widely popular in America is that known as the *ten-year nonforfeiture policy.* It secures insurance for life, purchased by ten equal annual premiums, and provides that, in case of default in the payment of any premium (some companies make it any premium after the second), the policy shall stand as equivalent to, or may be exchanged for, a participating paid-up policy for a sum equal to as many tenth parts of the sum originally assured as there shall have been annual premiums paid. Legally, and as far as the policyholder knows, the contract corresponds throughout with the ten-policy plan just discussed. It is liable to the same objections, and to a good many more, owing to the careless way in which the business has been paid for, and also to erroneous computations of net premiums, reserves, and bonuses. Every one of the requirements I have mentioned, as attending the carrying out of the ten-policy plan on correct principles, has been utterly neglected. Agents have been paid large initial commissions for securing ten premiums, nine of them "in the bush." All the actuarial tables ever published in regard to these policies have been computed on the untenable assumption of uniform net premiums. In most cases, consequently, when a policyholder ceases to pay premiums, the reserve required to be held on the paid-up policy remaining, is larger than that actually in hand from past premiums. In this way he actually gets a special bonus for discontinuing his payments, instead of suffering a just penalty. Almost every company in America (and this is more especially the case with those dividing surplus on the Contribution Plan) has suffered innumerable practical inconveniences from this singular confusion of ideas and customs.

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The ten-year nonforfeiture policy has always, for these reasons, been deemed objectionable in theory, by those who cared for theory. Its supposed acceptability preserved it from change for several years. Of late, however, it has declined in popularity; and certain of the larger companies have, as I have before intimated, made such alterations in their plans of business as to bring them into complete conformity with the only tenable theory—that of the secured ten-premium policy.

Not the least of the evils for which the ten-year nonforfeiture plan is responsible, is the encouragement it has given to the spread of loose views in regard to the lapsing of policies. There can be no doubt that the wholesale recommendation of this plan by the American companies, is the cause of much of the demoralization latterly prevailing in this regard. If the main object looked to in taking a policy is immunity in case of lapse, the holder cannot be expected to pay his premiums very persistently.

To sum up:

The *ten-year nonforfeiture plan*, as heretofore carried out in America, is a most vexatious arrangement, combining in practice two contradictory theories—the ten-policy theory, under which premiums may or may not be paid, and the secured ten-premium theory, under which all the premiums must be paid or something be forfeited.

The *secured ten-premium policy*, whether reserving the right to the company to fix the surrender-value according to circumstances, or itself specifying and guaranteeing proper surrender values, is a good contract for all parties concerned.

The *ten-policy plan* has never been rigorously carried out, at any rate not in America. It would have the advantage, common to all plans calling for large premiums, of securing at the start a class of risks of high average vitality. The only necessary difficulty attending it would be that, in case of adversity, the good lives would cease to pay premiums, while the deteriorated lives would keep their policies in full force. This difficulty, however, is insuperable.

I am, Sir,
Your obedient servant,

Northwestern Mutual Life Office. EMORY McCLINTOCK.
Milwaukee, U.S.A., 18 *Dec.* 1872.

*** In a letter which accompanied the above, Mr. McClintock makes some practical observations, from which we extract the following:—"Our present rule for ten-year life policies, is to issue in exchange, in case of lapse, a non-participating paid-up policy for an equitable sum, not less than two, three, &c., tenths. We regard the loss of participation as a penalty sufficient to make the new policies reasonably safe." "We have invested, this year alone, two millions of dollars at ten per cent. (semi-annually), on mortgages on property worth, in each case, about three times the amount of the loan, and have never lost a dollar of principal or interest."