of death benefits, as it is proposed to grant equal annuities to widows and orphans, regardless of the amount of salary and contribution.

Basis of Valuations.

5. It is presumed that the 5,593 persons referred to would all have been eligible as members of the fund if it had come into operation on the 31st March, 1907, and in order to examine the financial aspects of the scheme it is necessary to carefully value the liabilities resulting from the application to the whole of that body of the rates of contribution and retiring benefits. The basis upon which this valuation is made being naturally of great importance I think it desirable to set out in detail the assumptions made and the statistical foundations of the calculations. I feel this to be all the more necessary because, unfortunately, I am aware that the use of recognised actuarial methods, though admitted in smaller matters, is viewed with disapprobation and absolute suspicion by many people when applied to the investigation of certain complicated statistical and financial matters, although these matters peculiarly depend for their ultimate success on a proper treatment of problems involving a reasonable estimate of many probabilities— of life and death, widowhood, orphanhood, bachelorhood, increases in salary and retirement from service; all these being spread over a long series of years and combined with the interest-earning power of money. While it is impossible in individual cases to make an accurate estimate of such matters, it is found that in a large body of persons the numbers living, dying, or doing acts within their own control, such as resigning or marrying, are singularly constant from year to year.

Rate of Interest.

6. As to the financial basis, 4 per cent. is the rate of interest which I have assumed in the calculations. When consulted by the Right Hon. the Prime Minister last session I gave my opinion that the most satisfactory way of dealing with this matter would be for the Government to guarantee that rate of interest on the fund, as is done by many of the British railway companies in their pension schemes. With the powers of investment allowed by the Bill the fund will probably be able to earn more than 4 per cent. for some years, but without a guarantee it would not be justifiable to assume so high a rate as 4 per cent. over a long period of time. The difficulty would be entirely disposed of by guaranteeing the interest, and, whatever scheme is ultimately adopted, I strongly advise that this guarantee should be given, independently of the form any additional assistance may take. If this be not given the true liability will be greater, and if I am instructed to supply a 3½-per-cent. estimate I shall require a few weeks to complete the matter.

Mortality Table.

7. A pension fund must be of great age before a reliable mortality table can be based on the experience of its own members. It is therefore imperative to select as a basis a table founded on some other experience, and I have employed, for adults, the late Dr. Farr's well-known table relating to certain healthy districts in England, which I consider particularly appropriate to a New Zealand fund of this description.

Widows and Orphans' Annuities.

8. The necessary statistics (with the exception of the mortality experience) for ascertaining the liability on account of widows and orphans' annuities might be obtained from the experience of members and their families, but in order to avoid delay the information asked for was restricted to such as could be obtained from the departmental staff registers without reference to individual officers. For this purpose, therefore, I have used statistics derived from outside sources.

For children's annuities I have used the mortality experience of the children of a large body of Scottish Presbyterian ministers, which was investigated by Mr. Archibald Hewat in 1902.

The probabilities of leaving children, with their ages, have been taken from the New Zealand population returns (1895 to 1899).

The probabilities of leaving a widow or dying unmarried have been derived from English census statistics utilised by Mr. George King in his investigation relating to family annuities.

The ages of widows at death of husbands have been taken from the scale adopted by Mr. H. W. Manly in his "Hypothetical Experience (1903)."

Age at Retirement.

9. The average age at retirement is an important consideration. The optional age in the Bill is 60 for male contributors, but it is probable that many will not retire until after that age, thus making the average age later than 60. On the other hand, they will be allowed to retire as a matter of right before reaching 60 when they have served for 40 years, or, with the consent of the Board, after 35 years. Therefore all those who are under 20 when joining the service will be able to retire on pension between 55 and 60, and some of them between 50 and 55. For female contributors the optional age of retirement is 50, or earlier if there has been 30 years' service. Under the circumstances I have thought it right to assume that males will retire at 61, and females at 51, on the average.

Premature Retirements and Withdrawals.

10. Having no data to work on I am not able to estimate the strain on the fund on account of premature retirements on pension through medical unfitness for work, nor the relief that will ensue from those voluntarily retiring and leaving the interest on their accumulations in the fund. Fortunately these will tend to counteract each other, and, although I cannot speak confidently on this matter, I do not think the balance on either side will be very material, but the necessity is thereby shown for periodical investigations of the progress of the fund.

Scales of Salaries.

11. The contributions and benefits (except those payable to widows and children) and the valuation of them depend on the amount of salary received, *taking into account prospective increases in salary*. The average salary received at each age at the present time has been deduced