

*Report made by Mr. Samuel Brown to the International Statistical Congress, as to the Institute of Actuaries, &c.*

THE mere collection of statistics would be of little service to the public unless they were carefully analysed and compared, and those practical results deduced from them which may tend to benefit society at large. In every branch of statistics there are ardent inquirers into truth, ready to examine the facts collected, with the view of deducing therefrom those laws which seem to govern the mental, the moral, and the social as well as the material world. But there is one class of facts in which, in this country more especially, the results of statistical labours have been turned to the most practical use for the public advantage, and have led to the establishment of Companies of the highest importance, both in a social and commercial point of view. The questions regarding population, the causes of its increase or decrease, marriages, births and deaths, the diseases which end in the latter, and seasons of scarcity or plenty, which affect all alike, engaged at an early period the attention of English as well as foreign statisticians. Dr. Farr, in his Report on the Programme of this Congress, has ably pointed out how the mathematical school of statistics, commencing with Halley, and the construction of his Life Table, drew attention to the important application of population statistics to estimate the value of human life. There can be no doubt that it was owing to the scientific character of the men who first studied the question of vital statistics that life assurance in this country has been developed to so extraordinary an extent, and is established on so firm a basis. Halley, Demoivre, and Simpson laid the foundations of the science. Dr. Price exposed, with great ability, the false schemes of numerous Annuity Societies, and the ignorance with which they were conducted, and was directly concerned in the establishment, on a sound basis, of the first Society which put to practical use the science of life statistics—the Equitable Assurance Society. The appointment of his nephew, Mr. Morgan, as the Actuary of the Society, ensured its success, for it required both prudence and caution, and high mathematical attainments, to introduce principles then so novel and distrusted. Since then, the system has spread throughout the kingdom, till, by means of various Public Companies and Mutual Associations, a sum considerably exceeding £200,000,000 is secured for the families or representatives of the assured in this country, and which requires at least £6,000,000 in annual payments during the lives of the assured to meet these large accumulations at their deaths. Nor is this the only practical application of these doctrines of life statistics. Reversionary Interest Societies, for purchasing life interests or reversions depending on human life; Annuity Societies, to secure provision for old age or for survivorship in marriage; Endowment Societies, for providing capital to educate or put forward children in life; Friendly Societies and Sick Funds, for affording relief in sickness; all flourish or decay in proportion as the managers of them either understand the science of the probabilities of human life, or consult those who do; or, on the other hand, proceed in ignorance of, or persist in a wilful indifference to, the true laws which govern these events. All these interests, so great and varied, engage the attention of a body of men who, as actuaries of Assurance Companies, are bound to study the scientific principles on which the safety and prosperity of these Companies depend, and by their public character and mathematical education naturally take an interest in all those statistical

questions, in the investigation of which the doctrines of probability can be applied either to discover their laws of operation or to educe useful results.

With the view of combining the knowledge and stimulating the energy of the men engaged in these intellectual pursuits and useful labours, and, still more, of training the younger members of the profession to a more ardent cultivation of the science, the Institute of Actuaries was constituted in January, 1849, and the late John Finlaison, Esq., the Government Actuary, was elected the first President. On the recent and lamented death of Mr. Finlaison, Charles Jellicoe, Esq., was unanimously elected his successor.

The Institute was declared to be founded for the purpose of elevating the attainments and status and promoting the general efficiency of all who are engaged in occupations connected with the pursuits of an actuary, and for the extension and improvement of the data and methods of the science which has its origin in the application of the doctrine of probabilities to the affairs of life, and from which life assurance, annuity, reversionary interest, and other analogous institutions derive their principles of operation. It embraces, as its peculiar province of inquiry, all monetary questions involving a consideration of the separate or combined effects of interest and probability.

It will thus be seen that, under one or other of these heads, it comprises the study of most of the great questions of political or social economy, from the statistics of which the laws of their occurrence or recurrence can be deduced by the doctrines of probability, even though they may not give rise to public Societies to carry them into actual practice.

The Institute consists of Contributing Members, Fellows and Associates, and Non-contributing (namely, Honorary, Foreign and Corresponding) Members. At the present time the number of Fellows and Official Associates is about 66, of the Associates about 80.

Amongst the Honorary Members are enrolled the names of the late Mr. G. R. Porter, of the Board of Trade, whose statistical labours are so well known; Mr. Charles Babbage, F.R.S.; Professor De Morgan; Dr. Farr, F.R.S.; Mr. Benjamin Gompertz, F.R.S.; Mr. Peter Gray; Sir J. W. Lubbock, Bart., F.R.S.; the Right Hon. Lord Overstone, F.R.S.; Mr. John Tidd Pratt, M. Quételet, and Professor Sylvester, F.R.S. The Corresponding Members in Belgium, France, Germany, Holland, Russia, Sweden, and the United States of America, are connected mostly with the great assurance institutions of those countries, and have, many of them, rendered, by their writings or contributions to the *Journal*, valuable service to the literature of the subject. Amongst these may be mentioned MM. Joliat, Lafond, Le Hir, Maas, Pouget, Bruggemann, Hopf (of Gotha), Lazarus (of Hamburg), Masius, Daninos, Dr. Curtis, Professor Silliman, and Mr. Shepard Homans.

The Institute is governed by a President and Council. The Council consists of Fellows and Official Associates, out of whom the Members elect by ballot, annually, a President, four Vice-Presidents, a Treasurer, and two Secretaries.

One of the most efficient means of carrying out the purposes of the Institute has been the establishment of a system of voluntary examinations; the examiners being Members of the Institute, and a moiety at least of them being Fellows. The examination comprises mathematical theory, vital statistics, computation and construction of tables, bookkeeping, and office

routine. It consists of three parts, separated from each other by at least one year; and no Member is eligible for the final examination until he has attained the full age of 21 years. The first year's examination is confined principally to questions in general mathematics and geometry. The second year's examination comprises more difficult questions in the theory of logarithms, of probabilities, tables of mortality and annuities, and assurances on lives and survivorships. The third year's examination extends to (1) *Life Assurance Finance*—the construction and graduation of tables of mortality, the methods of determining surplus and distributing it in an Assurance Society; (2) *Legal Principles*—Acts of Parliament, partnerships, probates and letters of administration, assignments, bankruptcies; (3) *Statistics*—methods of collecting and arranging data, tests of accuracy, general system of the country's finance, funded and unfunded debt, and fiscal arrangements, taxation; (4) *Currency, Banking and Investments*—currency (metallic and paper), nature of banking, bills of exchange, comparative value of securities, high and low prices, fluctuations in the rate of interest; and (5) *Miscellaneous*—bookkeeping, auditing, valuation of marketable securities, and approximate calculations. Every year since the establishment of the Institute a number of candidates have presented themselves for these voluntary examinations, and several, who have passed, have distinguished themselves by the positions they have taken in life, and by their writings and contributions to the *Journal* of the Institute.

The *Assurance Magazine and Journal of the Institute of Actuaries* was commenced soon after the establishment of the Institute itself. It has now reached the ninth volume, and comprises a variety of articles of the greatest importance and public interest. The contributors to it are mostly, though not exclusively, members of the Institute. Besides original papers and those which are read at the sessional meetings, it contains foreign intelligence, relating to the vital statistics, Assurance Companies (whether for life, fire, or any other branch), Friendly Societies, &c., of all foreign countries; reviews of new works, reports of Companies, correspondence, and the proceedings of the Institute. It would be impossible, in the space allotted to me now, to give any idea of the many valuable original articles, either read at the sessional meetings of the Institute, or prepared expressly for the *Journal*, which are to be found in these nine volumes. Amongst the contributors of some of the most important papers, are Messrs. Jellicoe, Hardy, Hendriks, Higham, Gray, Hopf, Farren, Pinckard, Bunyon, Tucker, Lazarus, Hodge, Day, Porter, &c. Professor De Morgan has also contributed some original arithmetical papers of great value.

At the sessional meetings of the Institute, which are held monthly from November to May, some very interesting papers have been read and discussions held thereon. On all questions of great public interest it has been usual to invite gentlemen, not members of the Institute, who have either written on, or are distinguished for their knowledge of, the subject to be considered; and thus, by the opposition of views, not merely to elicit a lively debate, but to obtain, what should be the result of all discussion, the nearest possible approach to the truth. Amongst the questions of great public interest which have thus been debated, may be mentioned—"The injustice of taxing temporary annuities at the same rate as perpetual annuities." "The rates of mortality, as deduced from the actual experience of Assurance Companies, such as the Eagle, the Economic, the Life Assurance Bank of Gotha, the invalid lives in the Clerical, Medical and General;

risks of climate in America, in the Mutual Life of New York." "The sickness and mortality in Friendly Societies in Great Britain, France and Germany." "Decimal coinage." "The early history of life assurance and annuities, and the recovery by Mr. Hendriks of the lost treatise of the Grand Pensionary, De Witt, on the subject of life annuities." "The progress of the calculus of probabilities." "The true methods of valuing and the marketable values of life interests and reversionary properties." "On the rates of interest for the use of money in ancient and modern times." "On the annual reports of the Registrar-General, and how far the inordinate mortality of the country is controllable by human agency." These, and many other mathematical and professional questions, which, in connexion with life statistics, indirectly but deeply affect the public interest, show how many and varied are the questions opened up for discussion.

The Institute of Actuaries, having so many subjects in common with the Statistical Society, naturally takes the warmest interest in its labours and prosperity. It has for several years worked in harmony, and used the same apartments, and many of its members are also members of the Statistical Society, joining in the debates, aiding the operations, and contributing to the Journal of the latter Society.

It would appear, then, that, by their mental education and practical experience, the profession of actuaries is peculiarly called upon to take a warm interest in the great statistical subjects which have been examined and discussed at this and the previous Congresses. They cannot but feel it their duty and their pleasure to aid in improving the methods of collecting facts and forming statistical tables, in comparing their results in this and other countries, in analysing and correcting conflicting statements which are frequently given as facts, and in endeavouring to deduce from the vast collections which have been already made, or may hereafter be formed by the various Governments represented at this important Congress, those laws which affect the moral, the social, or the physical well-being of all classes of the community. They are ardently anxious to co-operate in a work of such great public advantage, and to assist, by every means in their power, to render practically useful the knowledge which is thus gleaned in the wide field of statistics.

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