

# THE INSTITUTE OF ACTUARIES AND STAPLE INN.

*An Address to the Society at Staple Inn, 23rd March, 1918.*

BY

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THE Institute of Actuaries was founded seventy years ago. Its first home was in St. James's Square. Later it migrated to rooms on the southern side of the Quadrangle where King's College stands, overlooking the Thames; and later to Adelphi Terrace, which looks across the river a little higher on its course. In 1888, as tenants of the Prudential Assurance Company, which had bought Staple Inn, the Institute found a home, which I hope will be a permanent one, in this spacious, beautiful and historic Hall. Here we now hold our sessional meetings between October and April of each year, and our monthly meetings of council. At first the Hall and the few small rooms adjoining answered all our purposes; but later, especially for our examinations, more room was required, and an additional Hall was built adjoining the older one. To that I will ask you to accompany me in a few minutes, as there I shall be able to show you the portraits of some famous mathematicians and actuaries of the past. We have, however, a few memorials here, about which a word or two may be said while we see them before us.

You see here a statuette of the famous "Napier of Merchistoun," the inventor of logarithms. As in the case of so many other famous inventions and discoveries, there are rival claimants for the honour, and curious evidence of the same thought having occurred almost simultaneously to more than one inquirer; but I think, on the whole, we may say that Napier's claim stands solid and his title clear. The repre-

sensation of the man which you now see is a reduced replica of the life-size statue in Edinburgh, and was presented to the Institute by a famous and brilliant Scottish actuary, the late James Meikle. On the occasion of the tercentenary of Napier's death, in 1917, a brilliant company of mathematicians met in Edinburgh to do honour to his memory. No one who has not had to make prolonged calculations can estimate the enormous value to science of the discovery of logarithms; and no one who has had that experience in however small a degree will deny that it is impossible to over-estimate that value. Based on a very simple mathematical principle, the invention revolutionised computation work. But Napier was a man who in his time played many parts, some of them I fear ungracious. Much of his time was taken up in litigation with his tenants and others. He was a theologian, of the controversial order, and wrote a great book on the Apocalypse. It is not unlikely that he thought this, his *magnum opus*, far worthier of remembrance than such merely secular things as logarithms. But it is dead, beyond possibility of resurrection, and the logarithms remain.

Opposite Napier you will observe the bust of a modern actuary, Dr. Thomas Bond Sprague. Senior wrangler of his day, he devoted his life to the actuarial profession. Upon actuarial subjects he wrote copiously, and always with sound judgment, acute perception, and admirable clarity. The actuarial students of mid-Victorian days probably derived greater help from his work than from any other single source. He still survives, at an advanced age, honoured and esteemed by us all.

Yet another bust is in this hall, and you see it before you. It is that of Sir George Francis Hardy, K.C.B., whose premature death in 1914 we still mourn. Of him it is difficult adequately to speak, without using what may seem to those who did not know him the language of exaggeration. It is, however, no more than the simple truth

to say that to mathematical genius of the highest order he united gifts of character and personality which make all of us who came within the circle of his influence feel that we shall not look upon his like again. With powers of analysis and exposition which have lighted up dark paths for innumerable actuarial students were associated a modesty, an instinct for fellowship, and a natural charm which captivated all whose privilege it was to come under their spell. His work for actuarial science is of great and enduring value; his intellectual sympathies were wide and keen, and touched life at many points; but beyond and behind all was the inexplicable something else, the sense of reserve power, which makes the difference between eminence and greatness.

(The speaker and audience moving into the new Hall, the speaker continued.)

What is an actuary? Perhaps I am not too presumptuous in supposing that even in an assembly so intelligent as this many would be puzzled to give a concise definition. That is not surprising, as actuaries themselves find it difficult. The fact is, I think, that no satisfactory concise definition is possible. An accurate idea can best be obtained by some kind of historical method: by considering how the actuary, as we now know him, has been gradually evolved under the conditions of mathematical research and inquiry. For a few words on this subject this Hall is a convenient meeting-place, for here we are fortunate enough to have in our possession a few portraits of distinguished pioneers of our science, which may lend some interest to the little I have to say about them.

Of the first and greatest, whose renown has other and broader bases, and whose name is familiar to you all, I am sorry we have no portrait. I refer to Blaise Pascal. A casual question put to that great man by a fashionable gambler, about a problem arising out of a game of chance, set his acute and powerful mind at work on the whole sub-



JOHN DE WITT,

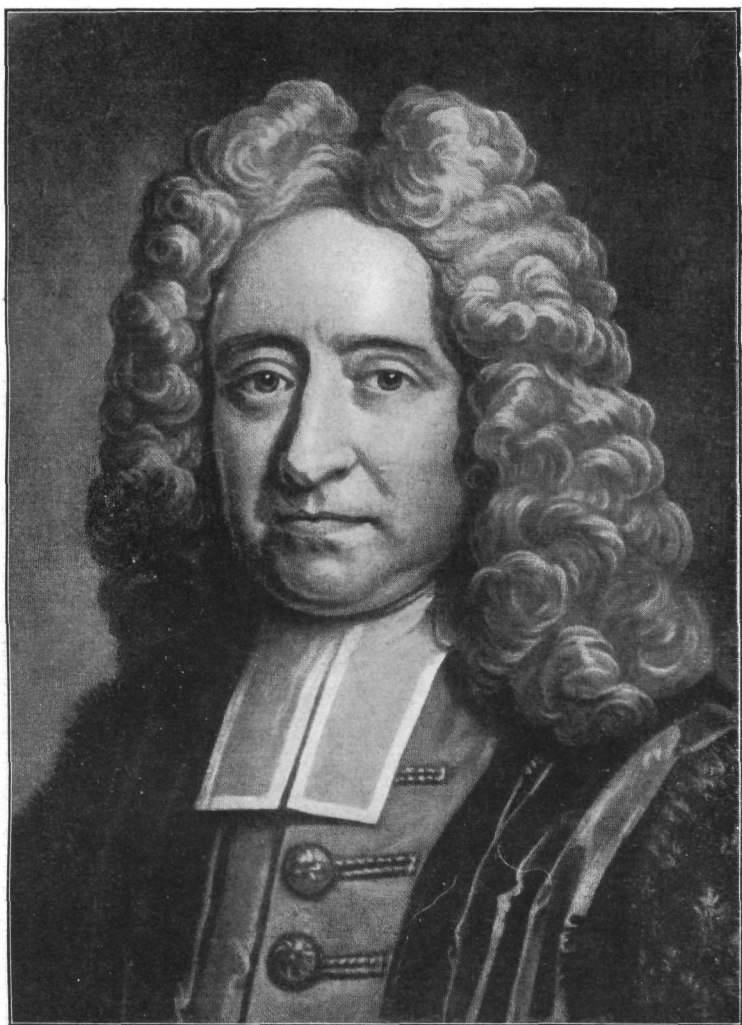
*Born Dort, Holland, 1625; murdered in a  
political rising, 1672.*

ject, and he propounded, in its elementary form, the Theory of Probability. It is not too much to say that therein lay the germ of actuarial science. The discovery that the mathematical probability of an event may be determined by finding the ratio to one another of the numbers of times at which, under given conditions, it can or cannot happen, opened wide a door of inquiry through which other explorers might enter. Away back in the seventeenth century the number of learned men in Europe was comparatively small; Latin, as the *lingua franca* common to them all, made communication easy, and new ideas readily spread. So we get the beginnings of the application of Pascal's theory to financial affairs. Life assurance as we now have it was then practically unknown, but life annuities were in request, and methods, more or less clumsy and blundering, for determining their value were being tried. In this connection I bring my second illustrious name before you—that of John de Witt, Grand Pensionary of Holland. Again a great man, and one whose reputation has a far wider range than now concerns us: a noble servant of his State, who at last, with his brother Cornelius, met a tragic death at the hands of a frantic mob. It was in connection with certain life payments to be made by the State that De Witt made his attempt at a scientific determination of the values of life annuities, based on the application of the Theory of Probability to mortality statistics. Here is another great step in advance. Of De Witt I am glad to be able to show you an interesting old portrait.

In talking of a science whose later development, as we shall find, was destined to be primarily British, it is satisfactory that the next great name I am able to bring before you is that of an Englishman—Edmund Halley—whose portrait I now show. He was indeed a man of illustrious and widely varied ability. His primary work was that of an astronomer, and I suppose he is most widely known to the public by having his name linked to the

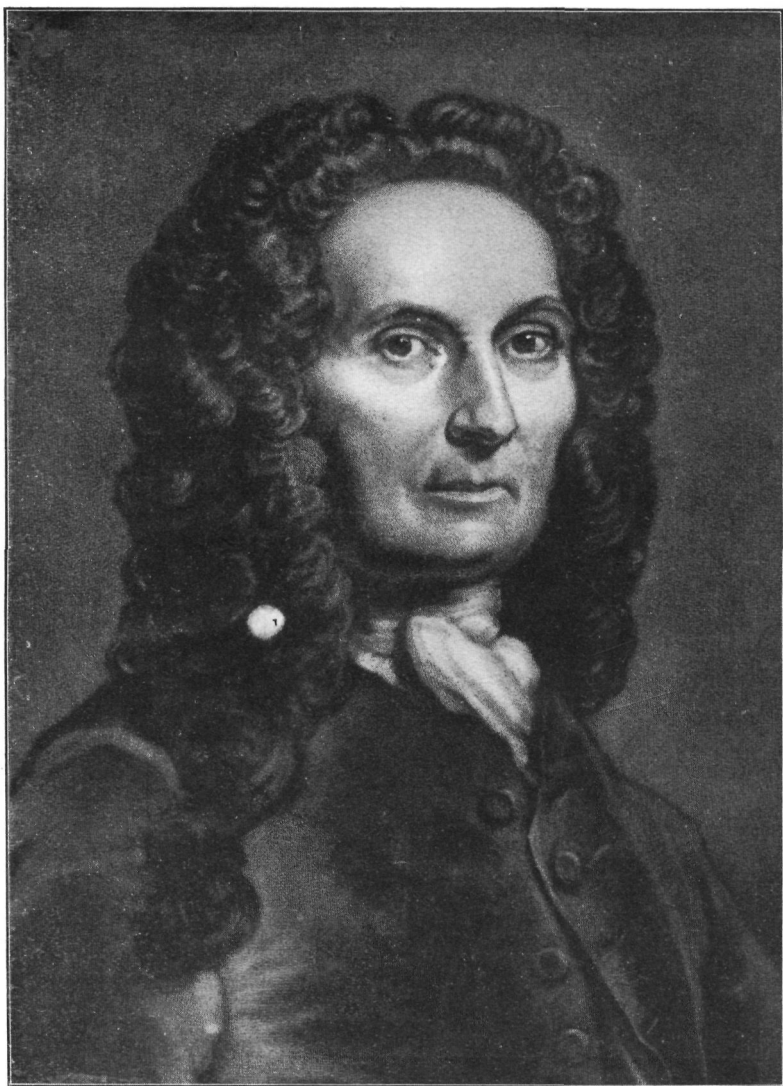
brilliant heavenly body of which he was the discoverer, and which is known as "Halley's Comet." But his work was far larger in its range than this would suggest. "While we thought," says a French critic, "that the eulogium of an astronomer, a physicist, a scholar, and a philosopher comprehended our whole subject, we have been insensibly surprised into the history of an excellent mariner, an illustrious traveller, an able engineer, and almost a statesman." He was an intimate friend of Sir Isaac Newton, and Dr. Glaisher has expressed the opinion that without him the immortal "Principia" would not have existed. He was Astronomer-Royal; and, what is more to our present purpose, he compiled the famous "Breslau Table of Mortality," by which, says Miss Clerke in the "Dictionary of National Biography," "he takes rank as the virtual originator of the science of life-statistics." The tribute scarcely seems exaggerated. Breslau seems to have the distinction of being, at that time, the only town which recorded the ages at death of its population. Working upon this, with the aid of the mathematical principles of Pascal and De Witt, Halley produced the first scientific "Table of Mortality" which we possess.

I come next to Abraham de Moivre, whose portrait is also here. He was a Frenchman by birth, but at the age of twenty-one came to England, an exiled Huguenot, one of the many rich gains our national life owes to the revocation of the Edict of Nantes. In England the remaining sixty-six years of his life were spent, and he wrote in English, so I think we may fairly claim him as our own. His place in this sketch is due to his book, "The Doctrine of Chances applied to the Valuation of Annuities on Lives," published in 1725; and his chief interest for us lies in the fact that he was a pioneer in what has always been a fascinating pursuit for actuaries: the endeavour to find an exact mathematical law of human mortality—that is to say, a formula which shall express, when applied to each successive year



EDMUND HALLEY, 1656-1742.

*Born Haggerston, London. Astronomer Royal, and Sec. R.S.*



ABRAHAM DE MOIVRE, 1667-1754.

*Born Vitry, Champagne. To England 1688.*



of age, the numbers living at that age out of a given number born. It is a problem which does not permit of exact solution, but subsequent research has made it possible, when dealing with large numbers, to come surprisingly near to such a result—near enough, in fact, to furnish a sound basis for financial calculation. De Moivre's suggestion was a simple one. He held that an equal number of lives, out of a given number born, died every year until all were extinct. Experience has shown that this theory must be abandoned, but as a "first shot" it was an amazingly good one, and it opened up a path of investigation leading to very fruitful results.

By this time the subject was becoming one of general interest, not only to scientists, but to business-men also. Annuities were growing in favour and in number, and side by side with them was beginning to be popular something else which has since outrun them in importance, the business of life assurance. This was a natural consequence. The annuity and the assurance depend on the same scientific principles. One is the corollary and counterpart of the other. In the first case a man buys for a sum down a payment to be made periodically throughout his life. In the second case he sells an annuity for a benefit to accrue at its termination.

We are perhaps now in a position to form some common-sense working idea, without anything so ambitious as a cut-and-dried definition, of what an actuary is. He is a man who can make calculations which involve the two elements of interest and mortality, and so give monetary values to benefits which depend on human life. That may not cover all the ground; I do not say it does; but if you carry it about with you as a working hypothesis you will not be far wrong.

Thus, from the days of its birth in these islands, actuarial science was linked with a commercial business; and practically all the earlier actuaries were associated, as

regular officials or as consultants, with life assurance offices. The same thing still holds, but less generally; for with modern social developments the study of life statistics has widened its practical scope. Friendly Societies, National Health Insurance, Census reform, and the problems constantly arising in connection with the welfare of populations require the assistance of the actuary, whose value as a national asset thus grows in importance.

It is now not far short of three-quarters of a century since the Institute of Actuaries was founded. Round these walls you will see many portraits which I have not mentioned. They are those of its past Presidents. Quietly and unostentatiously pursuing its purpose—holding sessional meetings at which papers are read and discussed, organising examinations to qualify candidates to take its diploma—it has rendered invaluable service to the science it represents; and I must mention along with it its sister-institution, the Faculty of Actuaries in Scotland, which has done like work as well and as honourably. It is perhaps with some just pride that we can claim, as an undoubted fact, that in this science Britain has led the world. There are other brilliant Actuarial Societies now, in America, in France, in our Colonies; but those of Great Britain are looked to by them all as their parents and as the pioneers of progress.

I have tried in these remarks to follow a method which has much attraction for me, and which seems to me the best in talking about a technical subject to those who are naturally unversed in its technicalities. It is the method of grouping what one has to say around outstanding and interesting personalities. In closing, I would like to mention just two more, whose portraits I am also able to show you, and who form in a sense connecting-links between the earliest beginnings of our science and its fuller development in later days. The first is Francis Baily, whose career extends from the last quarter of the eighteenth to about the middle of the

nineteenth century. Like the great Halley, whom I have already dealt with, he was a many-sided man, and, like him also, he was chiefly distinguished as an astronomer. A shrewd man of business, he made in his earlier years as a member of the Stock Exchange a competence which enabled him thereafter to devote himself to the studies on which his heart was set. He twice obtained the gold medal of the Royal Astronomical Society: once for the compilation of the "Astronomical Society's Catalogue" of 2881 stars, and again for his pursuit and successful completion of the experimental method of ascertaining the earth's density initiated by the famous Henry Cavendish, philosopher and misogynist, in his house on Clapham Common. Baily came under the spell of actuarial science, and we owe to him a treatise on "The Doctrine of Life Annuities and Assurances," which for long was one of our standard textbooks.

The other name is that of Baily's friend and contemporary of a younger generation, Augustus de Morgan, who, born in 1806, survived till 1871. Among the brilliant company of Victorian *savants* I think there is no more endearing or fascinating figure than his. Here again we deal with a man of many parts and of varied interests. The appealing qualities in him are his happy wit, his keen sense of humour, and his rigid devotion to principle. His "Budget of Paradoxes," perhaps the wittiest scientific book ever written, appeared in serial form in the pages of our Institute's Journal, and I always think it one of our greatest honours to have that work preserved in its pages. De Morgan was one of the band of able men who joined to found University College. For it he laboured through his best years, and he loved it as a father might a child. In it he saw embodied a principle as dear to him as life: the formation of a band of teachers with absolute freedom from any doctrinal test, and entirely irrespective of their religious opinions. When in 1866 he resigned his connection with the College because he

believed that principle to have been violated, there can be no doubt that the pain of the parting shortened his days. To the Morgan actuaries are indebted for services to their science of the highest value in his work on the Theory of Probabilities and his illuminating contributions on various problems of their science.

My tale is told, and I only hope that you have not found it wearisome, and that as the net result there may be for you some clearer idea of what an actuary is and what he tries to do. In any case, it has been a pleasure to me, as representing the Institute here to-day, to welcome you to our Hall; and I am sure in saying this I may safely add that I speak for my colleagues.