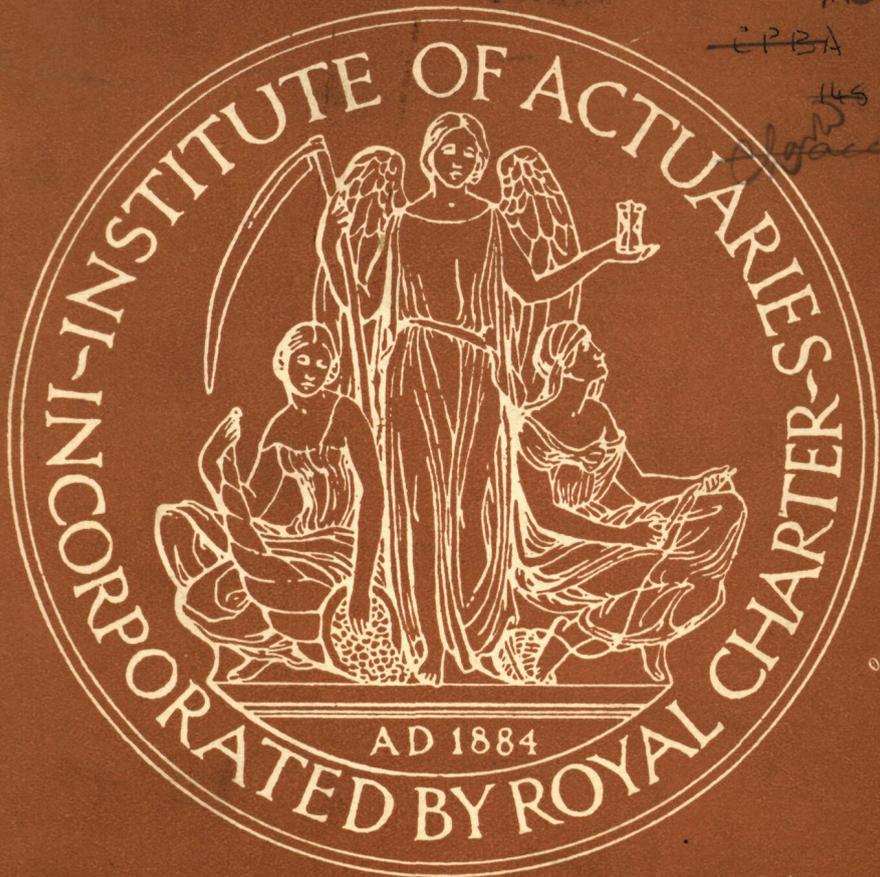


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*Alphonse*



# CENTENARY ASSEMBLY 1948

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EXHIBITION  
CATALOGUE

INSTITUTE OF ACTUARIES

1848-1948

# EXHIBITION

ILLUSTRATING THE  
HISTORY OF ACTUARIAL SCIENCE  
IN GREAT BRITAIN  
WITH SPECIAL REFERENCE TO  
THE INSTITUTE OF ACTUARIES

C A T A L O G U E

**INSTITUTE OF ACTUARIES**  
**CENTENARY ASSEMBLY, 21st—25th JUNE, 1948**

The Exhibition will be held in the Museum and the Council Chamber on the first floor of the Hall of the Chartered Insurance Institute, 20 Aldermanbury, London, E.C.2, and will be open at the following times:—

|                            |   |
|----------------------------|---|
| Tuesday, 22nd June, 1948   | 2 p.m. to 5 p.m.                                      |
| Wednesday, 23rd June, 1948 | 9.30 a.m. to 12.30 p.m.                               |
| Thursday, 24th June, 1948  | 9.30 a.m. to 12.30 p.m.<br>and 2.30 p.m. to 4.30 p.m. |
| Friday, 25th June, 1948    | 9.30 a.m. to 12.30 p.m.                               |

## FOREWORD

THE EXHIBITION has been arranged in the belief that those present at the Centenary Assembly of the Institute of Actuaries would be interested to have in one view exhibits illustrating the various strands that together make the Institute what she is. The exhibition is not complete : within the available space we can only illustrate the story of the past, but we trust that the exhibition, and this catalogue of it, may serve as some guide to any who may wish to read that story.

The exhibition relates primarily to the Institute of Actuaries. An important part of the field is represented by the sister body, the Faculty of Actuaries, which was formed in Edinburgh in 1856.

We take this opportunity to thank all those who have lent exhibits, especially Mr. H. W. Robinson, the Librarian of the Royal Society. Our sincere gratitude is also due to the Chartered Insurance Institute for the use of the Museum and Council Chamber for the purposes of this exhibition. Members of the Assembly will be interested to see the collection of fire-marks on the walls of the Museum. It is believed to be the finest collection of such marks in the world. Notes on the fire-marks are to be found in the Museum Catalogue of the Chartered Insurance Institute which is available for reference in the Exhibition.

We are also grateful to Mr. G. A. Coombe of the Prudential Assurance Company, Ltd., for much information and help in connection with the Staple Inn exhibits.

M. E. O.

## LIST OF ILLUSTRATIONS

- 1 Life table constructed by James Dodson from the bills of mortality for London, 1728-1750, reproduced with the permission of the Equitable Society.
- 2 A page from the statistics of Carlisle collected by John Heysham, M.D., reproduced with the permission of the Public Library, City of Carlisle.
- 3 Plan of the Exhibition.
- 4 John Finlaison, first President of the Institute of Actuaries.
- 5 The first page of the Charter of the Institute of Actuaries.

1 **John Napier, Baron of Merchiston (1550-1617)**

(a) "Mirifici Logarithmorum Canonis descriptio" 1614

(b) "A description of the admirable table of logarithms, etc., invented and published in Latin by Lord Napier, Baron of Merchiston, and translated into English by Edward Wright; with an addition of the instrumental table by Henry Briggs." (Bookplate and autograph, Peter Hardy) 1618

(c) "Arithmetica Logarithmica," by Vlack 2nd edit., 1628

(d) Statue

Plaster cast, presented by the Faculty of Actuaries in 1946 to replace the one destroyed with Staple Inn.

2 **John Graunt (1620-1674)**

(a) "Natural and Political Observations upon the Bills of Mortality" 2nd edit., 1662

*lent by the Royal Society*

This was the book which laid the foundation of "political arithmetic" and contained a rough table based upon the Bills

3 **Sir Isaac Newton (1642-1727)**

(a) "Methodus differentialis" 1711

(b) "Regula differentiarum"

*MS. lent by the University Library, Cambridge*

These exhibits illustrate Newton's work on finite differences. The first was published in 1711 by W. Jones with other papers by Newton. The second forms part of the "Portsmouth collection" at Cambridge.

4 **Edmond Halley (1656-1742)**

(a) "An estimate of the degrees of the mortality of mankind drawn from curious tables of the births and funerals at the City of Breslau"

Philos. Trans. 1693 n.s.

*lent by the Royal Society*

(b) Letter from Caspar Neumann to Halley concerning the Breslau Bills

*MS. lent by the Royal Society*

(c) "Some further observations on the Breslau bills of mortality"

*MS. lent by the Royal Society*

(d) Portrait of Halley at the age of 80, by Michael Dahl (Photographic reproduction)

*lent by H. W. Robinson*

The original portrait is in the possession of the Royal Society]

(e) MS. copy of Halley's table in a handwriting of the eighteenth century

The first mortality table computed from statistics, from the data for Breslau for

1687-1691 supplied to Halley by Caspar Neumann, a German Clergyman and Scientist. The last item was found in a copy of Smart's "Tables of interest etc." in the Institute Library: the handwriting has not been identified with certainty, but it may be Dodson's.

**5 Abraham de Moivre (1667-1754)**

- (a) "The doctrine of chances" 1718  
 (b) "Annuities upon lives; also of reversions" 1725  
 (c) "Miscellanea analytica de seriebus et quadraturis" 1730  
*lent by the Royal Society*  
 (d) Letter of 1736 from De Moivre commending a person for membership of the Royal Society *MS. lent by the Royal Society*

Gave the first systematic treatment, in English, of probability and of annuities upon lives. The solutions of the annuity problems were mainly based on the hypothesis of equal decrements. At that time statistics of mortality were few and unreliable and the hypothesis fitted Halley's table sufficiently well at the ages required for the valuation of annuities. De Moivre was French but fled to England at the revocation of the Edict of Nantes, 1685. He was a teacher of mathematics and Dodson was one of his pupils.

**6 Thomas Simpson (1710-1761)**

- (a) "The doctrine of annuities and reversions" 1742  
 (b) Letter of 1758 from Thomas Simpson dealing with series  
*MS. lent by the Royal Society*

Gave the methods of calculating annuities direct from observations. The bills of mortality for London had been given in age-groups since 1728 and Simpson used the bills for ten years, 1728-1737, as the basis for his mortality table. Above age 25 the table was the same as that computed by J. Smart (1738) but Simpson adjusted the figures at earlier ages to allow for the flux of population.

**7 James Dodson (c. 1710-1757)**

- (a) "The anti-logarithmic Canon" 1742  
 With MS. corrections by Peter Gray, F.R.A.S. 1878  
 (b) "Observations on the past growth and present state of the 'City of London,'" by Corbyn Morris 1751, 2nd edit. 1757  
 The statistics which Dodson used and on which life assurance was founded  
 (c) Letter of 1752 from James Dodson to John Robertson, F.R.S., suggesting improvements in the form of the bills of mortality  
*MS. lent by the Royal Society*  
 (d) "First lecture on insurances" MS. 1756  
*lent by the Equitable Society*

The original is not known. Two copies are exhibited

- (e) Monetary tables computed on the basis of the London observations as described in the "First lecture on insurances" MS. 1756  
*lent by the Equitable Society*

- (f) "The Mathematical Repository" 1747-55

- (g) Photostat copy of Will *lent by the Equitable Society*  
 "The anti-logarithmic Canon" was a classic work. The "Hand and Pen"

*A Table of decrements wherein the hazard of life is esteemed to be as great as any author has conceived it to be, or as can be deduced from any Bills of Mortality hitherto made public.*

| Age  | Persons Living | D   | Age | Persons Living | D  | Age | Persons Living | D  | Age | Persons Living | D |
|------|----------------|-----|-----|----------------|----|-----|----------------|----|-----|----------------|---|
| Born | 1400           | 148 | 22  | 1193           | 8  | 14  | 284            | 11 | 66  | 98             | 7 |
| 1    | 953            | 186 | 23  | 1185           | 8  | 15  | 273            | 11 | 67  | 91             | 7 |
| 2    | 766            | 71  | 24  | 1177           | 8  | 16  | 262            | 10 | 68  | 84             | 7 |
| 3    | 695            | 38  | 25  | 1169           | 9  | 17  | 252            | 10 | 69  | 77             | 7 |
| 4    | 657            | 22  | 26  | 1160           | 9  | 18  | 242            | 10 | 70  | 70             | 6 |
| 5    | 635            | 17  | 27  | 1151           | 9  | 19  | 232            | 10 | 71  | 64             | 6 |
| 6    | 618            | 14  | 28  | 1142           | 9  | 20  | 222            | 9  | 72  | 58             | 6 |
| 7    | 604            | 11  | 29  | 1133           | 9  | 21  | 213            | 9  | 73  | 52             | 6 |
| 8    | 593            | 10  | 30  | 1124           | 10 | 22  | 204            | 9  | 74  | 46             | 6 |
| 9    | 583            | 8   | 31  | 1114           | 10 | 23  | 195            | 9  | 75  | 40             | 6 |
| 10   | 575            | 7   | 32  | 1104           | 10 | 24  | 186            | 8  | 76  | 34             | 6 |
| 11   | 568            | 7   | 33  | 1094           | 10 | 25  | 178            | 8  | 77  | 28             | 6 |
| 12   | 561            | 7   | 34  | 1084           | 10 | 26  | 170            | 8  | 78  | 22             | 5 |
| 13   | 554            | 6   | 35  | 1074           | 10 | 27  | 162            | 8  | 79  | 17             | 4 |
| 14   | 548            | 6   | 36  | 1064           | 10 | 28  | 154            | 7  | 80  | 13             | 4 |
| 15   | 542            | 6   | 37  | 1054           | 10 | 29  | 147            | 7  | 81  | 9              | 3 |
| 16   | 536            | 6   | 38  | 1044           | 10 | 30  | 140            | 7  | 82  | 6              | 2 |
| 17   | 530            | 7   | 39  | 1034           | 10 | 31  | 133            | 7  | 83  | 4              | 1 |
| 18   | 523            | 7   | 40  | 1024           | 10 | 32  | 126            | 7  | 84  | 3              | 1 |
| 19   | 516            | 7   | 41  | 1014           | 10 | 33  | 119            | 7  | 85  | 2              | 1 |
| 20   | 509            | 8   | 42  | 1004           | 10 | 34  | 112            | 7  | 86  | 1              | 1 |
| 21   | 501            | 8   | 43  | 994            | 10 | 35  | 105            | 7  | 87  | 0              | 0 |

Life table constructed by James Dodson from the bills of mortality for London, 1728-1750, reproduced with the permission of the Equitable Society.

|    | 1   | 2   | 3  | 4  | 5  | 6  | 7  | 8  | 9   | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
|----|-----|-----|----|----|----|----|----|----|-----|----|----|----|----|----|----|----|----|----|----|----|----|
| 1  | 9   | 10  | 1  | 7  | 22 | 11 | 11 | 5  | 9   | 41 | 9  | 10 | 2  | 4  |    |    |    |    |    |    |    |
| 2  | 11  | 12  | 6  | 23 | 7  | 7  | 2  | 5  | 42  | 10 | 10 | 5  | 5  |    |    |    |    |    |    |    |    |
| 3  | 12  | 12  | 5  | 24 | 8  | 9  | 2  | 5  | 43  | 10 | 12 | 5  | 5  |    |    |    |    |    |    |    |    |
| 4  | 9   | 12  | 5  | 25 | 12 | 12 | 4  | 2  | 44  | 8  | 9  | 6  | 6  |    |    |    |    |    |    |    |    |
| 5  | 12  | 11  | 5  | 26 | 6  | 6  | 3  | 3  | 45  | 9  | 10 | 7  | 7  |    |    |    |    |    |    |    |    |
| 6  | 10  | 10  | 4  | 27 | 10 | 10 | 5  | 3  | 46  | 10 | 10 | 6  | 6  |    |    |    |    |    |    |    |    |
| 7  | 13  | 13  | 5  | 28 | 13 | 14 | 2  | 4  | 47  | 12 | 12 | 5  | 5  |    |    |    |    |    |    |    |    |
| 8  | 13  | 13  | 2  | 29 | 9  | 10 | 5  | 4  | 48  | 10 | 10 | 2  | 4  |    |    |    |    |    |    |    |    |
| 9  | 8   | 9   | 5  | 30 | 11 | 11 | 1  | 5  | 49  | 8  | 8  | 4  | 4  |    |    |    |    |    |    |    |    |
| 10 | 10  | 12  | 5  | 31 | 10 | 10 | 4  | 4  | 86  | 9  | 5  | 4  | 4  |    |    |    |    |    |    |    |    |
| 11 | 9   | 10  | 2  | 32 | 9  | 16 | 5  | 5  |     |    |    |    |    |    |    |    |    |    |    |    |    |
| 12 | 13  | 14  | 4  | 33 | 7  | 8  | 5  | 5  | 106 | 10 | 12 | 6  | 6  |    |    |    |    |    |    |    |    |
| 13 | 11  | 11  | 3  | 34 | 5  | 5  | 3  | 3  | 51  | 10 | 12 | 4  | 4  |    |    |    |    |    |    |    |    |
| 14 | 10  | 13  | 5  | 35 | 14 | 12 | 17 | 17 | 52  | 6  | 8  | 6  | 6  |    |    |    |    |    |    |    |    |
| 15 | 7   | 8   | 2  | 36 | 8  | 8  | 3  | 4  | 53  | 11 | 11 | 3  | 3  |    |    |    |    |    |    |    |    |
| 16 | 11  | 12  | 5  | 37 | 10 | 10 | 5  | 6  | 54  | 8  | 12 | 4  | 4  |    |    |    |    |    |    |    |    |
| 17 | 5   | 5   | 5  | 38 | 14 | 14 | 2  | 2  | 55  | 10 | 10 | 4  | 4  |    |    |    |    |    |    |    |    |
| 18 | 12  | 13  | 5  | 39 | 7  | 9  | 1  | 4  | 56  | 11 | 12 | 5  | 5  |    |    |    |    |    |    |    |    |
| 19 | 8   | 7   | 5  | 40 | 7  | 7  | 7  | 10 | 57  | 5  | 5  | 5  | 5  |    |    |    |    |    |    |    |    |
| 20 | 10  | 10  | 5  | 41 | 5  | 5  | 5  | 5  | 58  | 7  | 8  | 5  | 5  |    |    |    |    |    |    |    |    |
| 21 | 9   | 8   | 5  | 42 | 4  | 4  | 5  | 5  | 59  | 5  | 6  | 5  | 5  |    |    |    |    |    |    |    |    |
|    | 208 | 221 | 17 | 97 | 47 | 49 | 5  | 25 | 25  | 58 | 5  | 6  | 5  | 2  |    |    |    |    |    |    |    |

A page from the statistics of Carlisle collected by John Heysham, M.D.. reproduced with the permission of the Public Library, City of Carlisle.

referred to on the title page was the sign of a writing master and it seems likely that Dodson supported himself in this way and in the teaching of accounts while he was preparing the work. The "First Lecture" which has never been published, was the first exposition of the theory of life assurance and the statistics used were the London bills of mortality for 1728-1750. The monetary tables at 3 per cent. were those actually adopted by the Equitable Society at its inception in 1762. "The Mathematical Repository" was well-known. Dodson based many of the solutions on De Moivre's hypothesis and he seems to have computed the table he published on that basis. He was paid £1:11:6 per sheet, about £25 per volume, for the copyright of the work and was also to receive 25 printed copies as part of the bargain. Dodson's Will shows that he left little more than his expectation in the Charter Fund of the Equitable Society.

8 **Thomas Bayes (c. 1701-1761)**

- (a) "An essay towards solving a problem in the doctrine of chances"  
Philos. Trans., 1763  
*lent by the Royal Society*
- (b) Mathematical note-book  
*MS. lent by the Equitable Society*
- (c) Letter from Thomas Bayes to the Royal Society  
*MS. lent by the Royal Society*

After Bayes had died his papers were sent to Richard Price for examination. Price found the essay among the papers and prepared it for publication. The essay discusses the inverse probability theorem. The letter deals with the mean error when a number of observations are taken and refers to Thomas Simpson's work on the subject. Bayes's handwriting was distinctive and there is little doubt that the mathematical note-book was his own.

9 **Richard Price, D.D. (1723-1791)**

- (a) Copies of correspondence with John Edwards, the Actuary of the Equitable Society, on various actuarial problems  
*MS. 1768-1773*  
*lent by the Equitable Society*
- (b) "Observations on the expectations of lives . . ."  
Philos. Trans., 1769
- (c) "Observations on the proper method of calculating the values of reversions depending on survivorships"  
*MS. 1770*  
*lent by the Royal Society*
- (d) "Observations on reversionary payments . . ."  
1771
- (e) "Observations on the proper method of keeping the accounts and determining from year to year the state of the Society"  
*MS. 1775*  
*lent by the Equitable Society*

Copy exhibited. Original not known. The gist was included in Morgan's "Doctrine of Assurances"

- (f) Coffee pot presented to Richard Price by the London Annuity Society in 1790 or 1791  
*lent by the Equitable Society*

The coffee pot is inscribed "The London Annuity Society request Dr. Price's Acceptance of this small Token of their gratitude for his generous assistance in their final settlement." It was presented to the Society in 1933 by Arthur Cadogan Vachell, the great-great-nephew of Richard Price.

- (g) Engraving, after portrait by Benjamin West  
*lent by the Equitable Society*

**(h) Political cartoons**

*lent by the Equitable Society*

Many annuity and other societies had been started on an insufficient foundation. Price showed the principles on which such societies should be based. He was often consulted by the directors of the Equitable Society and after his nephew, William Morgan, had been appointed Actuary, Price was frequently seen riding his horse through the City streets to the Society's house near Blackfriars Bridge.

Price was a public figure, a friend of Benjamin Franklin and a supporter of the Americans in the War of Independence. He wrote on public finance and proposed the establishment of a sinking fund, a proposal which was afterwards adopted by Pitt, the younger Pitt, without acknowledgment to him.

**10 William Morgan (1750-1833)**

**(a) "The doctrine of annuities and assurances on lives and survivorships"** 1779

**(b) Computation of premiums on the basis of the Northampton table** MS. 1781

*lent by the Equitable Society*

**(c) Valuation of the Society's contracts individually** MS. 1786

*lent by the Equitable Society*

The dates at the beginning and end of the book show that the work took precisely one year to complete

**(d) "On the probabilities of survivorships between two persons of any given ages, and the method of determining the values of reversions depending on those survivorships"** 1788-1794

Reprinted from Philos. Trans.

**(e) Yearly computation of expected deaths and of accounts showing the state of the Society according to the plan suggested by Richard Price**

*MS. lent by the Equitable Society*

**(f) Four addresses to the General Court of the Equitable Society** 1811

**(g) Bust, by Joseph Towne (1808-1879)**

**(h) Reproduction of portrait by Sir Thomas Lawrence (from a paper by Sir William Elderton to the Faculty of Actuaries)**

William Morgan was appointed Assistant Actuary of the Equitable Society in 1774 and was elected Actuary in the following year, after the untimely death of his predecessor, John Pocock. In an unparalleled period of service of 56 years until his retirement in 1830, he built up the business of life assurance and laid the foundations of the actuarial profession.

**11 George Barrett (c. 1752-1821)**

**(a) Correspondence with Francis Baily** 1811-1819

**(b) Calculations based on Swedish, Northampton and Deparcieux's observations** MS., 7 vols.

The first commutation columns in Great Britain. They were offered to the various assurance offices for publication by subscription and to the Royal Society, but they were never published. William Dale had published the method in England in 1772 and J. N. Tetens in Liepzig in 1785 but Barrett made the discovery independently and to Barrett should go the credit for seeing the possibilities opened up by the new method. The London Life Association, Ltd., bought the MSS. in 1827 and later presented them to the

Institute. Barrett was by nature a calculator and appears to have been unsuccessful as a practising actuary.

12 **John Heysham, M.D. (1753-1834)**

(a) Census (1786) of houses, families and population, etc., of St. Mary's and St. Cuthbert's Parishes, Carlisle, including villages

(b) Eight letters (1781-1784) from William Wales, of Christ's Hospital, to Dr. Heysham, and circulars for distribution in the parishes

(c) Summaries and returns from the parishes

(d) Correspondence from and to Dr. Heysham with regard to his census

(e) "An abridgement of observations on the bills of mortality of Carlisle for the year 1779 to the year 1787 inclusive" 1797

*Items (a)-(e) lent by the Public Library, City of Carlisle*

(f) Portrait *lent by the Sun Life Assurance Society*

Heysham settled in Carlisle in 1778. He collected the statistics from which the Carlisle table was computed by Milne. Heysham took great care to ensure that his statistics were accurate.

13 **Francis Baily (1774-1844)**

(a) "Tables for the purchasing and renewing of leases . . ." 1797

MS. of work published 1802

(b) "The doctrine of life annuities and assurances analytically investigated and explained" 1810

MS. of work published 1810

(c) The same, author's own copy

(d) Reports to the Managers of the Sun Fire Office relative to the premium basis, etc., for the Sun Life Assurance Society which was then being formed 3 reports, MSS. April-May, 1810

*lent by the Sun Life Assurance Society*

The first manuscript was produced in the Court of Chancery on the occasion of the application for an injunction against the publishers of "Inwood's tables of Leases." "The doctrine . . ." was one of the best of the early expositions of the theory of life assurance. Baily was a member of the Stock Exchange and one of the founders of the Royal Astronomical Society. Baily used his influence as a member of the Royal Society to support Barrett in his efforts to publish his work on commutation columns. Baily gave specimens of the columns in the second edition, 1813, of "The doctrine . . ." There is a portrait of Francis Baily in the National Portrait Gallery in a group of men of science.

14 **Joshua Milne (1776-1851)**

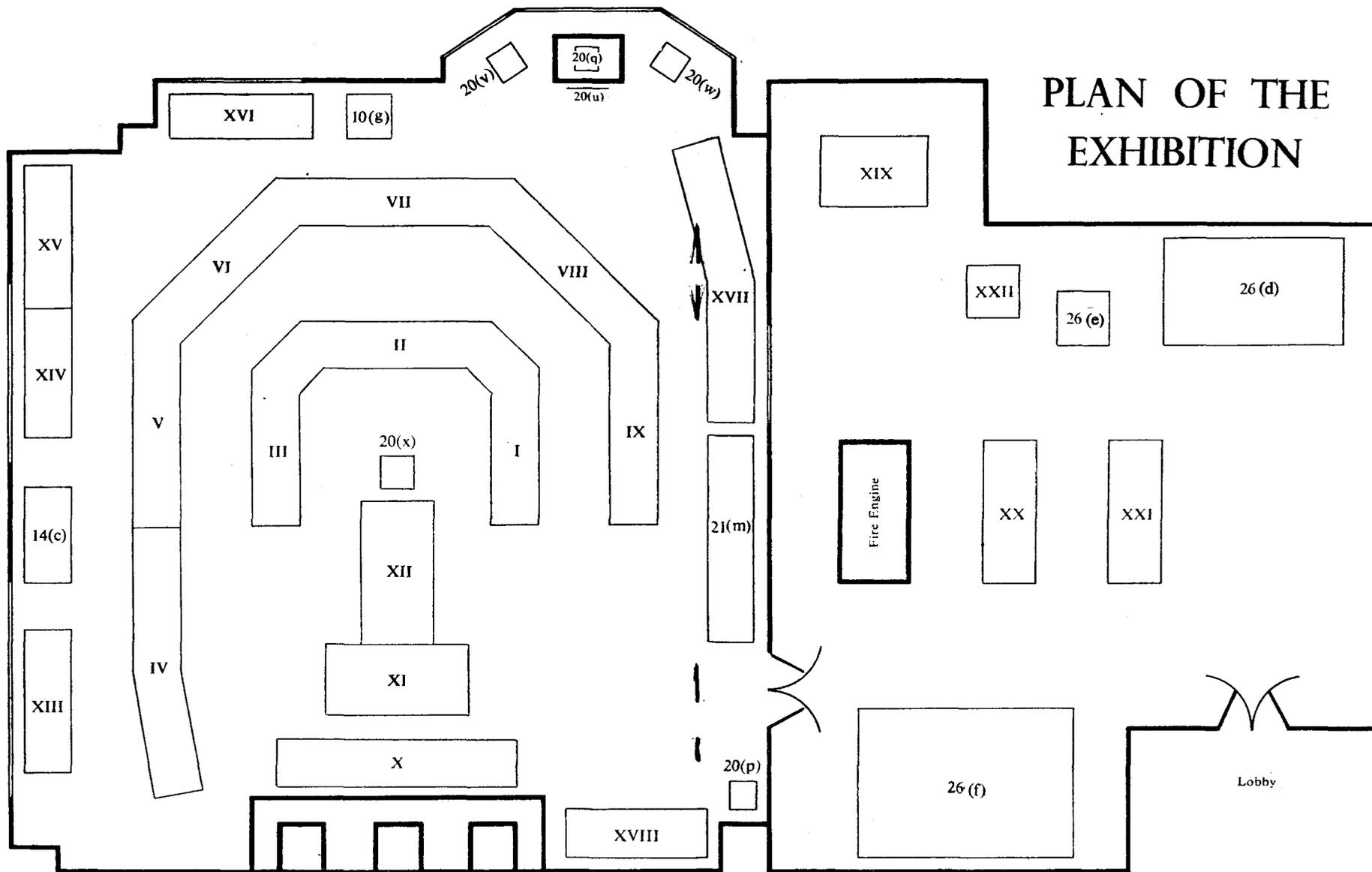
(a) "A treatise on the valuation of annuities and assurances on lives and survivorships, on the construction of tables of mortality, and on the probabilities and expectation of life" 1815, 2 vols.

Included the Carlisle table of mortality

(b) Portrait : engraving

(c) Telescope belonging to Milne

(d) Letter of 1844 from William Simms (the maker of the telescope) to Joshua Milne about its delivery



# PLAN OF THE EXHIBITION

## KEY

(The Arabic numerals refer to the relative sections of the catalogue)

| Table or Case | Catalogue Section |
|---------------|-------------------|---------------|-------------------|---------------|-------------------|---------------|-------------------|
| I             | 1, 2              | VII           | 9                 | XIII          | 12                | XIX           | 23                |
| II            | 3                 | VIII          | 10                | XIV           | 13, 14            | XX            | 20                |
| III           | 4                 | IX            | 10, 11            | XV            | 16, 17            | XXI           | 21                |
| IV            | 19, 5, 6          | X             | 20, 21            | XVI           | 15, 18            | XXII          | 26                |
| V             | 7                 | XI            | 20, 22            | XVII          | 24                |               |                   |
| VI            | 8, 9              | XII           | 20                | XVIII         | 25                |               |                   |

(e) Autograph of Joshua Milne on a letter of 1810 to J. H. Tritton, the banker  
*Items (b)-(e) lent by the Sun Life Assurance Society*  
 Milne was the first actuary of the Sun Life Assurance Society and he constructed the Carlisle table for their use. He was greatly interested in astronomy. The "treatise" was, perhaps, the best of the early works on life contingencies.

15 **Benjamin Gompertz (1779-1865)**

(a) "Sketch of an analysis and notation applicable to the value of life contingencies" Philos. Trans., 1820

(b) "On the nature of the functions expressive of the laws of human mortality, and on a new mode of determining the value of the contingencies" Philos. Trans., 1825  
*lent by the Royal Society*

(c) MS. letters bound with reprinted papers

(d) Gompertz's own copy of various tables relating to Government annuities, etc. *lent by the Alliance Assurance Company Ltd.*

The paper of 1825 put forward the law of mortality known by Gompertz's name. Further developments of the law were put forward in a paper to the Royal Society in 1861. Gompertz was the chief officer and first actuary (1824-1847) of the Alliance Assurance Company. Story has it that Nathan Rothschild was leaning one day against his favourite pillar in the Royal Exchange—long known as "the Rothschild Pillar"—when his brother-in-law Gompertz ran up to him in a high state of excitement. "Vat ish de matter?" queried Rothschild. Gompertz recounted in gasps how he (though being admittedly the best candidate) had been beaten in the competition for the vacant actuaryship of a large insurance company on account of his religion; the directors declared they would have no Jew. Now Nathan too got excited. "Vat!" he cried, disengaging his hands from his pockets, and laying hold of his brother-in-law by the shoulders, "Not take you peacuse of your religion! Mein Gott! Den I will make a bigger office for you than any of 'em." And Nathan was as good as his word. (See the "Insurance Cyclopaedia" by Cornelius Walford.)

16 **Griffith Davies (1788-1855)**

(a) Values of assurances by Northampton 3 per cent. MS. 1820  
*lent by the Commercial Union Assurance Company Ltd.*

(b) "Tables of life contingencies" 1825

(c) "An investigation of the bases for calculating life contingencies, of the profits on life assurances, and of an equitable method of apportioning those profits by way of bonus among those assurers" MSS., 1822-1831  
 Twenty-four reports by Griffith Davies  
 Probably (in part) original *lent by the Guardian Assurance Company Limited*

The tables of 1825 gave the first full commutation columns published in Great Britain. Davies was Welsh and born of poor parents. He set up as a teacher of mathematics and became the first Actuary (1822-1854) of the Guardian Assurance Company. He was also Actuary of the Reversionary Interest Society from 1823. His interest in reversions may have suggested the preparation of the table based on the experience of the Equitable Society. This should not be confused with Arthur Morgan's table. Davies computed his by reference to the Northampton table on the basis of the proportions of actual to expected deaths given by William Morgan. Davies showed how, in capable hands, good results may be obtained from very scanty data. The "investigation" was for the use of the Guardian who also have a set of tables prepared by him.

17 **John Finlaison (1783-1860)**

(a) A letter from George R. Dawson of the Treasury to the Commissioners for the Reduction of the National Debt with a copy of a report dated 5 November 1829 by John Finlaison regarding the basis for the sale of annuities  
*lent by the National Debt Office*

(b) A "morning's work" on the Royal Exchange experience  
1721-1830 MS., 1831  
*lent by the Royal Exchange Assurance*

(c) Letter of 1831 from John Finlaison to the Commissioners for the Reduction of the National Debt  
*lent by the National Debt Office*

(d) MSS. of the experience of Government life annuitants 8 vols.

John Finlaison was the first President of the Institute of Actuaries. He was Keeper of the Admiralty Records 1809-1822 and Actuary of the National Debt 1822-1851. He compiled the first Navy List in 1814. His report in 1829 led to the Northampton table being superseded by Finlaison's table for the sale of annuities by the Government. The report refers to the experience of the London Life Association and of the Royal Exchange Assurance. The letter of 1831 was a report on his terms of appointment prepared by Finlaison at the request of the Commissioners. The MSS. relate to the later experience of Government life annuitants. One day in 1831 Finlaison called on Augustus de Morgan for breakfast. Finding that De Morgan had the experience of the Royal Exchange Assurance Corporation temporarily in his possession, Finlaison at once sat down and, before breakfast, produced the table exhibited.

18 **Augustus de Morgan (1806-1871)**

(a) Letter from De Morgan dated 31st August, 1850, with regard to the Royal Exchange experience *MS. lent by the Royal Exchange Assurance*

(b) Two letters to Richard Sheepshanks—one of 1848, the other "before 1844"—referring to Babbage and Baily and to Peter Gray and logarithms *MSS. lent by the Goldsmith Library, University of London*

(c) Caricature by A. Lucas  
*lent by the Goldsmith Library, University of London*

Augustus de Morgan was Professor of Mathematics at London University and an honorary member of the Institute of Actuaries. He wrote a good deal on actuarial subjects and was consulted by various life assurance societies. He was a great-grandson of James Dodson, the founder of the Equitable. Richard Sheepshanks was the astronomer.

19 **English translations of foreign authors**

(a) Various essays on political arithmetic by W. Kersseboom  
1742-1748

Kersseboom (1691-1771) was famous for his life table based on the experience amongst annuitants. Nineteenth century MS., translator unknown. Presented to the Institute by the President, John Finlaison, in 1849

(b) "Essai sur les probabilités de la durée de la vie humaine," by M. Deparcieux  
Paris, 1746

The essay contains the life tables computed by Deparcieux (1703-1768) from the experience of monks and of tontines. Nineteenth century MS., translator

unknown. Presented to the Institute by the President, John Finlaison, in 1849

(c) "Contributions to the history of insurance . . . with a restoration of the Grand Pensionary De Witt's treatise on life annuities," by F. Hendriks 1850-51-54

Johann de Witt (1625-1672) appears to have been the first to give the formula for a life annuity. His arithmetical calculations were based on an assumption which foreshadowed De Moivre's hypothesis.

## 20 The Institute of Actuaries

(a) Charter

(b) Bye-laws (original, bound with Charter)

(c) Journal of the Institute of Actuaries

The first 26 volumes belonged to J. A. Higham and were presented to the Institute by his son, C. D. Higham. The remainder have been bound to match

(d) Album of portraits of Presidents of the Institute

(e) Minutes of meetings preparatory to the formation of the Institute MS. 1848

(f) Printed papers and cuttings, collected by Peter Hardy 1848

(g) "A statement of facts connected with an anonymous circular and the proceedings at certain meetings of actuaries and others officially connected with life assurance companies," by E. Ryley, 1848

(h) First volume of Council minutes

(i) Constitution and laws, including list of members and (for 1850) library catalogue 1849 and 1850

(j) The same 1851

(k) The first sessional paper delivered to the Institute: "A paper on the construction of logarithms," by Griffith Davies MS. 1849

(l) Other early sessional papers—

"On the methods pursued in valuing the risks of life assurance companies, and on the division of surplus," by Charles Jellicoe

1849-50

"On the value of selection amongst assured lives," by J. A. Higham 1850

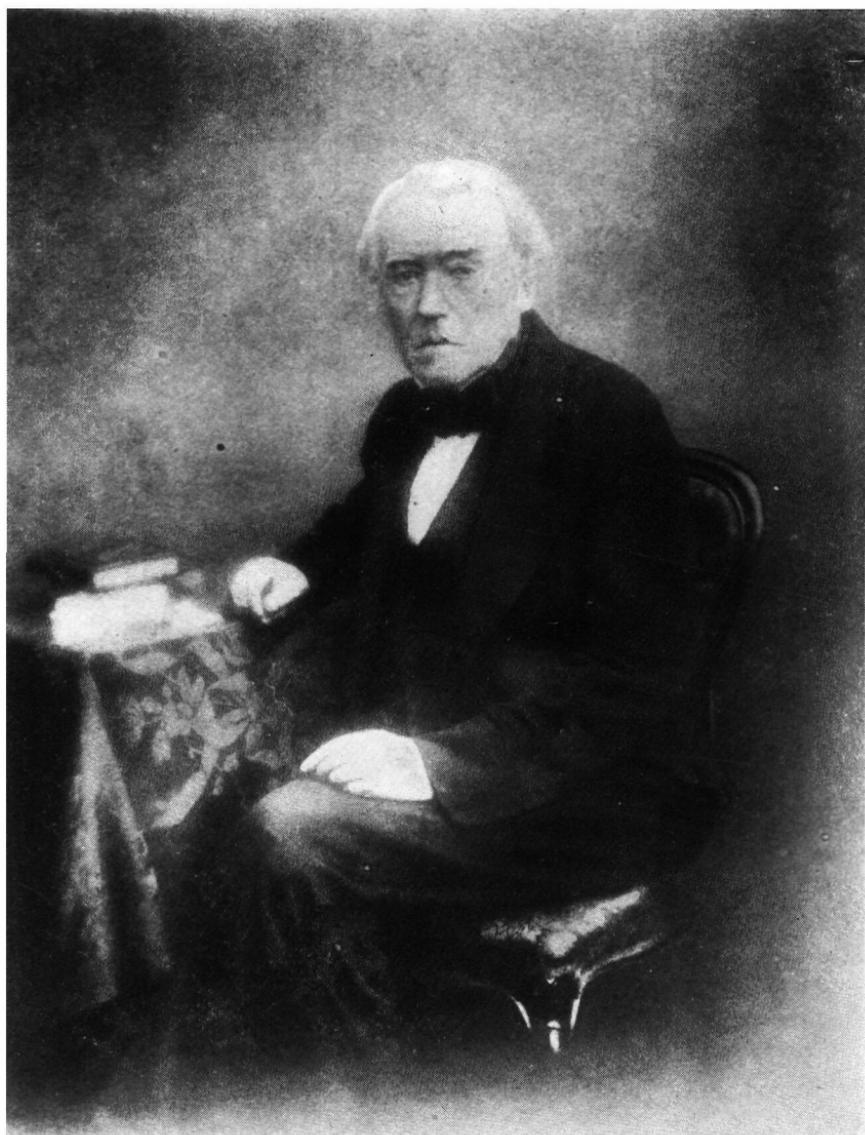
(m) "The Insurance Cyclopaedia," by Cornelius Walford 1871-1878

*lent by the Alliance Assurance Company, Ltd.*

The dedication is of interest. "To the President, Council, Fellows and Associates of the Institute of Actuaries of Great Britain and Ireland and to the President, Council, Fellows and Associates of the Faculty of Actuaries in Scotland; I respectfully dedicate this work in the hope and belief that its contents will be found of such interest and value as to entitle it not only to their recognition, but to their permanent regard, as the production of an earnest fellow-labourer in the field of enterprise to which their labours and their lives are devoted."

(n) The first Institute text-book on life contingencies: "On life contingencies, including life annuities and assurances," by George King 1887

Also exhibited are notes of lectures by George King in the session 1906-7 on the history, construction and graduation of mortality tables, etc.



John Finlaison, first President of the Institute of Actuaries.



- (o) Composite photograph of Fellows of the Institute, 1898, with Key  
*lent by the Gresham Life Assurance Society, Ltd.*
- (p) Thomas Bond Sprague—marble bust by MacGillivray 1902
- (q) Sir George Francis Hardy, K.C.B., bronze bust by Gilbert Bayes 1916
- (r) Gold medal presented to George King (Electrotype reproduction) 1927  
*lent by the Royal Mint*
- (s) Gold medal by Gilbert Bayes, presented to George James Lidstone, LL.D., jointly by the Institute and Faculty of Actuaries  
Plaster cast, 1929
- (t) Gold medal by Gilbert Bayes, presented to Sir William Palin Elderton, K.B.E., jointly by the Institute and Faculty of Actuaries  
Plaster cast, 1937
- (u) War memorial tablet, 1914-1919, and Roll of Honour, 1939-1945
- (v) Chair, from the set presented by William Peyton Phelps in 1932  
The set was destroyed with Staple Inn Hall in 1944
- (w) The President's chair  
From the set presented by George James Lidstone to replace the set given by William Peyton Phelps in 1932 which was destroyed with Staple Inn Hall in 1944
- (x) The lectern  
Presented by Abraham Levine in 1945
- (y) Message from the Actuarial Society of America and the American Institute of Actuaries to the Institute and Faculty of Actuaries in 1945
- (z) "The Institute of Actuaries, 1848-1948" by Reginald Claud Simmonds 1948

## 21 Staple Inn

### Pictures of Staple Inn as it was

- (a) The frontage to Holborn
- (b) The north quadrangle (2 views)
- (c) The interior of the Old Hall
- (d) The garden (4 views)

### Pictures of Staple Inn in August, 1944

- (e) The north quadrangle
- (f) The interior of the Old Hall
- (g) The garden (2 views)

*Album, lent by R. C. Simmonds*

### Message of sympathy

- (h) Message of sympathy sent by the Faculty of Actuaries to the Institute of Actuaries on the destruction of Staple Inn

### From the Old Hall

- (i) Mace, formerly belonging to the Ancients of Staple Inn

The Mace bears the inscription :—

"The Ancient Socy. of Staple Inn 1553, Hutton Wood, Principal 1816."

It is not known what was the special significance of the date 1553. The mace was presented to the Institute of Actuaries in 1923 by Sir Joseph Burn, K.B.E., on behalf of the Directors of the Prudential Assurance Company, Ltd. It was understood that the Directors desired that the mace should always remain associated with the Hall.

(j) Pewter *lent by the Prudential Assurance Company, Ltd.*

(k) Dinner plate from the Staple Inn dinner table ware  
*lent by R. C. Simmonds*

(l) Vases made from the timber of the Old Hall, Staple Inn  
*lent by S. H. Jarvis*

(m) Stained glass

Forty-seven panels have survived. We show eight of the more interesting specimens. Some of the glass dates from the seventeenth and eighteenth centuries and one panel includes the arms of Elizabeth.

*lent by the Prudential Assurance Company, Ltd.*

### Reconstruction

(n) Illustration of proposed reconstruction of Staple Inn  
*lent by the Prudential Assurance Company, Ltd.*

Two coloured drawings, each 40" × 27", prepared 1948

### Other pictures of Staple Inn

(o) Staple Inn Hall

Photograph of the Hall as it was when the Institute of Actuaries first occupied it in 1887

(p) Etching of the frontage to Staple Inn

(q) Views of the archway and two doorways showing initials and dates

The Gothic doorway to the Hall bore the initials of Thomas Leach, Principal and the date, 1753. The other doorway bore those of John Thomson, Principal and the date, 1747.

(r) Sundry photographs

*Items (o)-(r) lent by the Prudential Assurance Company Ltd.*

Originally a place for the collection of dues on goods entering the City, the early connection of Staple Inn was with the wool trade. The "Staple of Westminster" was removed to a "place called Staple Inn in Holborn" in 1375. The occupation was not for long and early in the fifteenth century Staple Inn became an Inn of Chancery and was affiliated to Gray's Inn. The Prudential Assurance Company, Ltd., bought Staple Inn at public auction in 1886 with the purpose of maintaining its unique character and the tenancy of the Institute of Actuaries began in 1887, since when Staple Inn has gained a special place in the affections of members of the Institute and, indeed, of actuaries everywhere. An engraved stone states:

"Original building erected 1545-1589 by Vincent Enghame and another. The rear elevation was cased in brick, 1826. The front elevation was restored to its original design in 1886. The entire building was reconstructed in 1937, the old front being retained."

In the Hall itself, the corbel over the oriel window bore the date 1581 and the initials R.C., probably those of Richard Champion who is assumed to have been Principal in 1581 when the Hall was built.

The reconstruction did not affect the Hall which was in its original state. It was destroyed in 1944. It is hoped to rebuild the Hall in a similar style and to restore the Institute to its occupancy as formerly.

## 22 The Actuaries' Club

- (a) Albums of portraits of members of the Club (3 vols.)  
*lent by the Club*
- (b) First volume of minutes  
*lent by the Club*
- (c) Memorandum by J. J. Downes on the early history  
Photostat copy *lent by the London Life Association, Ltd.*
- (d) Annals of the Actuaries' Club 1895
- (e) "Early history, the Club, the Institute, the Institute Club, the Association," by C. D. Higham 1929  
Higham's copy with notes *lent by Sir William Elderton*
- (f) "The Actuaries' Club, 1848-1948" by George Hugh Recknell 1948

## 23 The Amicable Society

The Society was founded in 1705. The original plan upon which it was founded was that each year's premiums from all the members should be divided among those that died, but the plan underwent several modifications. The business was transferred in 1866 to the Norwich Union Life Insurance Society. In 1872, the Society seems to have been reconstituted and to have been concerned with local government in the City of Westminster. It is now known as the "Amicable Society of St. Clement Danes."

- (a) The original Charter of Incorporation with the Great Seal of England 1706
- (b) The first minute book
- (c) "A table of durations of lives and a table of the expectancy of life deduced from the table of durations, together with notes thereon," by Charles Brand 1778

This contained the Amicable experience for 1706-1777. Brand inserted the table in his edition, published in 1780, of "Tables of interest, discount, annuities etc." by J. Smart. Brand seems to have computed the mean duration of the lives that had died, arranged according to age at time of assurance, but he does not state how he dealt with the existing at close of observations.

- (d) The mortality experience of the Amicable Society, 1807-1851,  
MS. by Thomas Galloway

This is the story of a complete mortality investigation. It contains an explanation of the principles and methods used in the investigation and tables of the various mortality functions, including the expectation of life, based on the experience.

- (e) Reprint from the "Westminster Record and West London News," 11 April 1936, relating to the Amicable Society of St. Clement Danes  
*Items (a)-(e) lent by the Norwich Union Life Insurance Society*

## 24 The Equitable Society

The Society was founded in 1762. A plaque commemorating the place where scientific life assurance began is to be seen on the site of the Society's first house, the parsonage of St. Nicholas Acons, in St. Nicholas Lane. It is now the rear of Westminster Bank, Lombard Street, where the building adjoins the graveyard. See also the exhibits under Dodson, Price and Morgan

(a) Declaration of trust dated 27th September, 1762, supplemental to the Deed of Settlement dated 7th September, 1762, under which the Society was established

(b) First volume of minutes of the Weekly Courts

The Weekly Courts were the meetings of the Board of Directors. The volume is open at the making of the first assurance on the life of Edward Rowe Mores

(c) First volume of minutes of the General Courts

The General Courts were the General Meetings of Members. The volume is open at the investigation of the Society's affairs in 1776 prepared by William Morgan according to the plan suggested by his uncle, Richard Price

(d) The first Alphabet (i.e. index) of lives assured 1762-1773

(e) The first Ledger (i.e. register) of assurances 1762-1806

(f) "A short account of the Society for Equitable Assurances on Lives and Survivorships" 5th edit., 1764

The first prospectus

(g) Office copies of proposals, 1768-1771

(h) General cash account for the years 1776-1787

(i) The Deed of Settlement, with MS. notes and two addresses by William Morgan Leather bound, 1776

(j) Record of claims, 1806-1814

(k) Tabulation of deaths for Arthur Morgan's experience of 1762-1829 (MS.)

(l) Mortality experience, 1762-1829, by Arthur Morgan 1834

(m) "An account of the mortality experience of the Equitable Life Assurance Society and of the tables deduced therefrom" by Henry William Manly MSS. 1912

Manly was Actuary (1893-1905) of the Society. This account formed the basis of his paper to the VIIth International Congress, Amsterdam, 1912

(n) "The birthplace and genesis of life assurance," by J. G. Anderson 2nd edit., 1940, leather bound

Notes on the history of the Society

*Items (a)-(n) lent by the Equitable Life Assurance Society*

## 25 Miscellaneous

(a) Volume of autographs presented in 1870 to Rev. John Hodgson, M.A., founder and first Secretary of the Clergy Mutual Assurance Society  
*lent by the London Life Association, Ltd.*

(b) Commutation columns based on "Government tables" MS.  
*lent by the London Life Association, Ltd.*

The tables appear to be those of Finlaison's table published in 1829

(c) "Tables of interest, discount, annuities, etc.," by John Smart, 1726, with MS. addition of various problems and of bills of mortality from 1728-1741. The bills have been continued to 1771 in another hand  
*lent by the London Life Association, Ltd.*

John Smart was Clerk to H.M. Commissioners of Lieutenancy for the City of London, 1714-1739, and Deputy Town Clerk until his death in 1742. The minutes during his period of office as Clerk are in a distinctive handwriting identical with that of the exhibit, which is, therefore, Smart's own copy.

(d) "Scheme of the Yorkshire Tontine Society for the benefit of survivors at the expiration of seven years" 1790

*lent by the Yorkshire Insurance Co., Ltd.*

(e) The first life assurance policy dated 6th June, 1721, of the London Assurance—minute of the transaction

*lent by the London Assurance Corporation*

(f) Declarations of burials made by the clerk or incumbent certifying burial in the days before death certificates

*lent by the London Assurance Corporation*

(g) "Chronological and Statistical Chart of the Life Assurance Associations established in the United Kingdom from 1706 to 1863, showing where they are, when and how they disappeared"

Compiled and edited by Morrice A. Black, Actuary

*lent by the Alliance Assurance Co., Ltd.*

(h) A map of Ireland, inserted in a report of business conditions in that country, prepared by Peter Hardy (1813-1863) MS. 1852

*lent by the London Assurance Corporation*

Hardy was the first professional Actuary (1850-1861) of the London Assurance Corporation. His tour of Ireland occupied three weeks and cost £51 10s.

(i) A table of valuation of participating policies of the London, Edinburgh and Dublin Life Insurance Company compiled by E. O. Glynn, certified by Griffith Davies MS. 1842

*lent by the Royal Insurance Company, Ltd.*

The tables show the value by Carlisle 3 per cent. of £100 assurance effected at any age from 15 to 75 years, after the expiry of any period not exceeding 35 years.

(j) The mortality experience of sinking fund life annuities nominees and also of the various tontines up to 31 December 1850, by Alexander G. Finlaison MS. 1854

*lent by the National Debt Office*

A continuation of John Finlaison's 1829 experience

## 26 Calculating Machines

### (a) Japanese Abacus

*lent by L. J. Comrie, Ph.D., Scientific Computing Service*

### (b) The arithmometer (No. 1461)

*lent by the Lord Charnwood*

The first commercially useful calculating machine was the arithmometer invented by Charles Xavier Thomas of Colmar in Alsace (1785-1870). He used the stepped wheel invented by Leibnitz (1646-1716). Thomas's first machine was made in 1820 and one of the machines was shown at the 1851 exhibition in London. About 500 machines were made up to 1865 and 1,000 more by 1878. Thomas became manager of the Soleil Assurance Office in Paris. The model shown is No. 1461, and was made about 1870. It has a capacity of  $6 \times 7 \times 12$ . It was used during the war of 1939-45. An earlier model is in the Science Museum, South Kensington.

A German version of the machine was produced in 1878 and an English version, Layton's (or the "Tate") in 1883. This machine was illustrated in George King's text-book.

With the exhibit is a working model constructed by the Science Museum staff under the direction of Dr. Calvert to show the principle of the Leibnitz stepped wheel.

**(c) The Comptometer**

*lent by Felt and Tarrant, Ltd.*

The first machine of the keyboard type was the "Comptometer" which was patented by Dorr Eugene Felt in 1887 in the United States of America. Patents were taken out in England in 1888, 1890 and 1896. The exhibit is one of the earliest type made for commercial use, the wooden box model, No. 3495. With the exhibit is a photograph of the first Comptometer, an experimental model made about 1886. It was made out of a macaroni box and was operated by rubber bands in place of springs.

**(d) The analytical engine**

*lent by the Science Museum*

Charles Babbage (1792-1871) designed "a difference engine" for the Government. Work was commenced in 1823 and discontinued in 1833. The original project was designed to operate to sixth differences, the result and the first two orders of differences each having 26 figures and the higher orders of differences 20 figures each. The completed portion consists of only three columns, each of five figures. The machine is in store and cannot be exhibited.

We show a portion of the analytical engine which Charles Babbage commenced to design in 1833 at his own expense for calculating and printing the numerical values of any given algebraic formula, where a numerical solution is possible, from given values of the variables.

The formula was to be communicated to the engine by two sets of perforated cards, which would also control the action of the machine so as to produce automatically the correct results. Apart from this Jacquard apparatus the mechanism consisted of a "mill" and a "store." The operations of addition, subtraction, multiplication, and division were performed in the "mill" and the results were then transferred to "store." The store would consist of a large number of vertical columns of wheels, each wheel figured from 0 to 9. Originally it was intended to have a thousand such columns (termed "variables") with 50 wheels in each column.

The small portion shown, which was put together shortly before Charles Babbage's death in 1871, is a part of the mill with printing device.

(Information supplied by the Science Museum.)

**(e) The analytical engine**

*lent by the Science Museum*

In 1880 Maj.-Gen. H. P. Babbage (son of Charles Babbage) commenced to construct a portion of the "mill" of the analytical engine, not as part of the large engine which his father had designed, but as a separate calculating machine which might be of practical use in the hands of a skilled operator.

The work was carried on intermittently from 1880 to 1896, and again from 1906 to 1910. During the latter period the engine as exhibited was completed by Mr. R. W. Munro, under Maj.-Gen. Babbage's supervision. A device was added for printing the calculated results on paper, from which a zinc block could be made.

(Information supplied by the Science Museum.)

**(f) The differential analyser**

*lent by Standard Telephones & Cables, Ltd.*

The first practical model was designed by Dr. V. Bush of the Massachusetts Institute of Technology. The model shown is a small-scale model constructed by a Fellow of the Institute, Robert Eric Beard, in 1939-1940 with the assistance of Professors D. R. Hartree and H. S. W. Massey. The machine was used during the war (1939-1945) by Standard Telephones & Cables, Ltd., for the solution of problems in valve design arising out of radar research.

*Additional information, about the stained glass from Staple Inn, which has been supplied by Mr. J. W. L. Forge of the Prudential Assurance Company, Ltd., to supplement section 21(m) of the Catalogue.*

The forty-seven stained-glass panels from the windows of Staple Inn Hall were removed in 1939 and stored in a cellar, thus escaping destruction when the Hall was destroyed by a flying bomb in August 1944.

The glass is entirely heraldic and, with the exception of a few royal panels inserted as a patriotic gesture, is confined to the arms of the worthies of this Inn of Chancery. The oldest glass, which is of the late sixteenth and early seventeenth centuries, is among the finest in London :—

#### *Lower Left Centre*

The badge of the Prince of Wales, afterwards Charles I, 1618. A noble design showing the three feathers on a ' sun in splendour ' (the favourite badge of Edward IV) surrounded by the Garter.

#### *Lower Right Centre*

The Arms of Elizabeth. England quartering France. The lilies, as evidence of an old territorial claim, were not dropped from the Royal Arms until 1801.

#### *Lower Left*

The Arms of Champion, probably that Richard Champion, Principal of Staple Inn, who was apparently responsible for the erection of the hammer-beam roof of the Hall in 1581, since his device of ' three trefoils slipped ' was inlaid into the timbers.

#### *Lower Right*

The Arms of Nicholas Brokus, sometime Principal.

#### *Upper Left*

The Arms of Sir Richard Hutton, who entered Staple Inn in 1578 and was Judge of Common Pleas 1617.

#### *Upper Right*

The Arms of Sir Thomas Walmesley, Judge of Common Pleas 1589.

#### *Upper Left Centre.*

The device of Staple Inn, a silver wool-sack on a green field.

The Commonwealth period put a stop to the craft of stained glass in England. With the series of panels from the early eighteenth century, we see that the destruction of the source of raw material, the manufactories of Lorraine, by Louis XIII, had led to the artist's relying on painting for the outlines of his design, the position of the lead 'comes' being quite arbitrary. A panel of early nineteenth century glass is exhibited for comparison with that of two hundred years earlier :—

*Upper Right Centre*

The Arms of Sir Alan Chambré, Young Mess of Staple Inn 1757, Judge of the Exchequer Court 1799. Among the charges on this shield is the curious device of Visconti of Milan—a crowned serpent devouring a child.

Later in the nineteenth century a gallant but unsuccessful attempt was made to imitate mediæval glass. Much of that at Staple Inn belongs to this period ; as its interest is heraldic rather than artistic or historical, none has been included in this exhibition.