NOTES ON FOREIGN ACTUARIAL JOURNALS

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AMERICA

Transactions of the Actuarial Society of America, Vol. XLIX, Part 2, Oct. 1948

H. R. BASSFORD and J. G. BEATTY. *Joint Presidential Address,* pp. 277–287. An account of the Centenary assembly which will give pleasure to members of our Institute. This is followed by a short statement on recent life insurance developments outside America.

L. O. SHUDDE. *Mortality Standard Provisions in Estate and Inheritance Tax Laws,* pp. 288–295. The variations between states are remarkable.

A. M. NIESSEN. *Recent Mortality of Railroad Annuitants,* pp. 296–302. Non-disability annuitants have a heavier mortality than purchasers of annuities at all ages of retirement except 60–64 where the mortality is about the same as that of purchasers. The mortality of all retirants is generally heavy during the early ages of retirement. The mortality is lighter than that of the general population. There is no significant difference according to amount of annuity.

M. SPIEGELMAN. *Construction of the State and Regional Life Tables* 1939–41, pp. 303–327. Descriptive of the methods adopted, etc.

R. E. EDWARDS. *The Mathematical Approach to Exposure Formulas,* pp. 328–336. Uses subscripts and superscripts in an endeavour to help students who have difficulty in following the traditional approach.

A. WHITE. *Interlocking Interpolation Curves,* pp. 337–364. Osculation requires that adjacent curves meet at the common border and that derivatives up to a certain order are, there, identical. The finite difference analogy would be to make sub-differences, based on the values produced by the two curves at points centred about the border point, equal up to a given order. This follows up Beers's suggestion in *T.A.S.A.,* XLV, in discussion of Greville's paper (noticed in *J.I.A.* Vol. LXXIII, p. 140).

M. D. MILLER. *Group Medical Expense Insurance,* pp. 365–379. Describes benefits and gives a claim experience.

C. L. TROWBRIDGE. *Approximations to Actuarial Functions without construction of Complete Commutation Columns,* pp. 380–384. A known approximation is $_5p_x \doteqdot (p_{x+2})^5$. The author suggests $(1 - kq_{x+2})^5$, where $k = 1\cdot006$, as an improvement and gets good results.

Reports of Joint Committee on Mortality, pp. 468–476, *of Committee to prepare Mortality and Morbidity Studies on Group Insurance,* pp. 477–542, *and of Committee on Aviation,* pp. 543–553. The second report includes some valuable statistics on the experience of group conversion mortality, etc., and that on Aviation gives statistics which include experience in 1947 of the U.S. Air Force.

The Record. American Institute of Actuaries, Vol. XXXVII, Part II, Oct. 1948

J. GORDON BEATTY and H. R. BASSFORD. *Presidential Address,* jointly with the President of the Actuarial Society (see notes on the *Transactions*), pp. 145–154.

N. HARPER. *Policy-Drafting,* pp. 155–201. General considerations are followed by discussions of the whole life policy and then of other plans.

C. J. NESBITT and M. L. VAN EENAM. *Rate functions and their Role in Actuarial Mathematics,* pp. 202–222. A formal theory of rate functions is developed as an alternative approach to the usual combination of concepts of interest theory and probability theory. An interesting study.

C. H. TOOKEY. *Underwriting of Group Insurance on Other than Regular Employer-Employee Cases,* pp. 223–241. Recent developments in the group insurance field have been in the direction of extending cover to groups formed by unions, professional or creditor associations, etc. where there is no employer-employee relationship. This paper describes the underwriting rules necessary for successful conduct of this type of business.

W. R. JONES. *Actuarial Note: Mortality Experience at Ages Zero to Four, Inclusive, on Ordinary Insurance with Full Death Benefit at Age One,* pp. 242–244. The increasing schedule of sums assured below age 10 no longer exists generally in the U.S.A. Figures are here given to justify the grant of the full sum assured on attainment of age 1 and at least 25 % at age 0.

J. S. HILL. *Actuarial Note: Punched-Card 'Successive Multiplication' as Applied to Calculation of Reserves and Other Operations,* pp. 245–249. Describes how the multiplying punch may be used to calculate a complete table of reserve values by means of a continuous process based on the familiar recursion formula connecting policy values.

E. G. BROWN and C. H. CONNOLLY. *Actuarial Note: 3 per Cent Commutation Columns Based on Multiples of 1941 Commissioners Standard Ordinary Table,* pp. 250–266. The multiples used are 125, 150, 175, 200, 250, 300, 400 and 500 %.

G. E. CANNON. *A Study of Persistency,* pp. 267–282. The statistics here analysed show, once again, that the ability of the agent writing the business is supremely important.

T. N. E. GREVILLE. *Mortality Tables Analyzed by Cause of Death,* pp. 283–294. A discussion of the methods available for deriving, from observations, life tables in analysed form, namely with the deaths subdivided according to cause.

The Minutes of the Semi-Annual meeting held in October 1948 (pp. 404–413) are of considerable interest in view of their connexion with the union of the Institute and the Actuarial Society.

BELGIUM

Association Royale des Actuaires Belges, No. 54, 1948

M. E. OGBORN. *Remarques sur le taxation en matière d'assurance vie et de rentes viagères,* pp. 5–16. Explains the method of taxation adopted in the United Kingdom.

J. G. KYD. *L'élargissement de la sphère d'influence de l'actuaire*, pp. 17–21. Describes the extension of actuarial activities in the United Kingdom.

H. JECKLIN. *La notion de vie moyenne et sa portée pratique*, pp. 23–39. Evolves some interesting approximations to annuity values by using the ideas underlying the weighted mean.

R. RISSER. *Essai sur les courbes de distribution statistique*, pp. 41–72. Considers forms of curves if, in the Pearson differential equation, the denominator includes terms up to x^4. The reader should compare this with G. H. Hansmann's investigation in *Biometrika*, vol. XXVI, pp. 129 *et seq.*, to which the author does not refer.

The number also reproduces the presidential address by J. G. Beatty and H. R. Bassford—see above under *Transactions of the Actuarial Society of America*.

FRANCE

Bulletin Trimestriel de L'Institut des Actuaires Français,

Nos. 180–181, Sept.–Dec. 1947

B. COMBES. *Le principe de Bayes et le problème de l'ajustement. Application à la construction des tables de mortalité*, pp. 1–70. This thesis for senior membership of the French institute is essentially concerned with the estimation by maximum likelihood of the rate of mortality at age x based on the observation of the ratio of deaths to exposed to risk at the n ages $\alpha, \alpha + 1, \ldots, x, \ldots, \beta$ and on the hypothesis that the 'true' rates monotonically increase with age. The author points out that the resulting method is only suitable as a preliminary smoothing of data prior to graduation and illustrates it on the old AF table and on a new mortality table of invalid lives.

[No. 182, March 1948

P. PELLEGRIN. *Tarification de l'assurance automobile*, pp. 19–103. A general discussion of the French statistics dealing with claims of various kinds in Paris and provinces and of how the information can be used in fixing premiums. The paper includes a number of interesting graduations.

Nos. 183–184, June–Sept. 1948

E. DUCHEZ. *Étude sur l'organisation d'un service statistique centralisé en matière d'assurance Incendie de Risques Industriels*, pp. 131–360. A theoretical study of the collection and use of statistical information on fire risks. The paper was written while the author was in Oflag VIII f, so that there is no actual statistical work. It is to be hoped that he will extend his study in this direction.

HOLLAND

Het Verzekerings-Archief, Jaargang XXVII, No. 4, 1948

M. VAN HAAFTEN. *La notation universelle (V) et les signes de commutation pour deux têtes*, pp. 229–254. Discusses various joint life commutation symbols comparing the Davies' and De Morgan's forms and suggests defining $D_{xy} = D_x l_y$, $D_{yx} = D_y l_x$ etc. He also suggests that C^1_{xy} and M^1_{xy} be expelled from the official notation.

C. CAMPAGNE. *Het aequivalentie-beginsel in de verzekeringswiskunde*, pp. 255–280.

J. ENGELFRIET. *Anatomie van de actuaris*, pp. 281–301. These two lectures were given at the University. The first deals with the importance of probability in insurance (actuarial) work and the second with what should be the actuary's attitude to his problems.

SCANDINAVIA

Skandinavisk Aktuarietidskrift, Vol. XXXII, Parts 3–4, 1948

E. KIVIKOSKI. *Über die Konvergenz des Iterationsverfahrens bei der Berechnung des effektiven Zinsfusses*, pp. 135–156. Discusses the convergence of iteration processes to find the interest rate i involved in a bond transaction. The Makeham relation $i = g \dfrac{C - K}{A - K}$ necessarily leads to convergent series if $A < 1$; it always results in a divergent series if $A \geqslant 3$.

W. SIMONSEN. *On Divided Differences and Osculatory Interpolation*, pp. 157–164. An alternative derivation of Johansen's general osculatory divided difference formula.

E. ZWINGGI. *Initiation of a Formula for Approximate Valuation of Premiums for Disability Benefits*, pp. 165–170. On the assumption that active and disabled lives suffer the same mortality, the error made by replacing l_x^{aa} by l_x in both numerator and denominator of the annual premium for a unit disability pension is expressed as an annual premium for a special disability benefit.

H. AMMETER. *A Generalisation of the Collective Theory of Risk in Regard to Fluctuating Basic-Probabilities*, pp. 171–198.

T. SAXÉN. *On the Probability of Ruin in the Collective Risk Theory for Insurance Enterprises with only Negative Risk Sums*, pp. 199–228. In Lundberg's collective theory of risk the probability of a claim occurring is assumed invariant with time and the development is made in terms of positive sums at risk. These two papers provide generalizations. The former develops the theory appropriate to the case where the invariant probability of claim occurrence is the mean of a distribution of claim probabilities of Type III form. In the latter Lundberg's theory is developed *de novo* for negative sums at risk (e.g. annuities).

H. WOLD. *On Stationary Point Processes and Markov Chains*, pp. 229–240. If the occurrence of an event at a certain point of time is conditioned by h previous point occurrences a point process of local contagion exists. This paper provides a mathematical definition of point processes, links them with Markoff chains, and proves an ergodic theorem.

Nordisk Försäkringstidskrift

The October 1948 number contains an article by Prof. K. Secher, M.D., on *Variations of the blood-pressure in connexion with medical examinations for life insurance*. Since 1940 every person signing a proposal form in Denmark must have his blood-pressure examined; the paper gives much statistical

information. The January 1949 number contains a lecture by Kurt Hasler of the Swiss Reinsurance Co. on *Nationalisation of Insurance: a survey of the actual situation in various countries*. A valuable collection of information which should be studied carefully. Though these papers are not written in English, substantial summaries in that language are available.

SWITZERLAND

Owing to war-time difficulties of postage the Institute has only recently received Part 2 of each of volumes XLI, XLII, XLIV, *and* XLVI *of the Swiss Mitteilungen. For completeness we are reviewing these journals below.*

Mitteilungen der Vereinigung schweizerischer Versicherungsmathematiker,
Vol. XLI, Part 2, 1941

P. BALTENSPERGER. *Über die Vorausberechnung der Sterblichkeit der schweizerischen Bevölkerung,* pp. 109–161. An interesting contribution to the theory of forecasting mortality. An analysis of Swiss deaths by cause permits a subdivision of mortality into a part where no further improvement is to be expected and a part where the author assumes 1928–35 rates will eventually be halved. It is shown that Makeham 'generation' curves are unsuitable for forecasting Swiss mortality and a representation of $\mu_x(t)$ in the form $\mu_x(t) = A + Bc^x + (rx^2 + sx + p)C^{-t}$ is used instead. An important result is that future mortality improvements are not likely to lower premium rates to anything like the same extent as the improvements noticed in the first twenty years of this century.

H. SCHÄRF. *Über einige Variationsprobleme der Versicherungsmathematik,* pp. 163–196. Theorems relating to series and functions of bounded variation lead to a unified and more general theory of changes in premiums and policy values resulting from changes in mortality and interest.

H. CHRISTEN. *Eine Bemerkung zum Thema: Das Deckungskapital der gemischten und der terme-fixe-Versicherung bei Änderung der Sterblichkeit,* pp. 197–200. A fairly involved relation between endowment assurance policy values based on two different mortality assumptions permits a simple assessment of the circumstances under which one set of policy values exceeds the other. An extension to *terme fixe* policies is demonstrated.

E. DASEN. *Note sur l'approximation du taux effectif des emprunts par obligations amortissables par le système de l'annuité constante,* pp. 201–204.

H. KREIS. *Zerfällung einer Gesamtheit in Aktiven- und Invalidengruppen,* pp. 205–209. Develops a criterion which must be satisfied if l_x is to be analysed into active and disabled lives. Cp. Steffensen in *Akt. Vĕdy,* Vol. VI (*J.I.A.* Vol. LXXIV, p. 353).

H. WYSS. *Die Berichte des XII. Internationalen Kongresses der Versicherungsmathematiker* 1940, pp. 211–224. A review of the papers appearing in *Trans. Twelfth I.C.A.*

Mitteilungen der Vereinigung schweizerischer Versicherungsmathematiker,
Vol. XLII, Part 2, 1942

E. ZWINGGI. *Bemerkungen zur Reserveberechnung nach der t-Methode,* pp. 151–154. In the *t*-method (cp. *J.I.A.* Vol. LXXI, p. 418) assurances with different unexpired terms are grouped according to duration and valued as if they all

entered at an average age ρ determined from $c^\rho = \Sigma c^x S_x / \Sigma S_x$. In theory ρ has to be calculated afresh each year, but in practice, as the author shows by means of two actual groups of entrants in 1924 and 1925, respectively, variation in ρ from year to year is small enough to be ignored.

H. AMMETER. *Das Zufallsrisiko bei kleinen Versicherungsbeständen*, pp. 155–182. A familiar development of individual risk theory leading to the representation of the probability distribution function of loss by means of a Charlier A-series. The numerical examples are useful and show how important a security loading (or reserve) is in the case of funds with less than about 1000 lives assured.

P. LEGRAS. *Über das asymptotische Verhalten der Erneuerungsfunktion*, pp. 183–204. A historical account of the problem of finding the solutions of the integral equation

$$\phi(t) = p(t) + \int_0^t p(t-x)\,\phi(x)dx \quad (p(t) \geqslant 0; \quad \int_0^\infty p(t)dt = 1)$$

is followed by the derivation of an asymptotic relation of the form

$$\phi(t) \sim \left(\int_0^\infty t p(t)dt \right)^{-1} + \sum_{j=1}^\infty e^{-\Sigma_j t}(A_j \cos \eta_j t - B \sin \eta_j t),$$

where $z_j = -\Sigma_j - i\eta_j\,(j = 1, 2, 3, \ldots)$ are the roots of $1 - \int_0^\infty e^{-zt} p(t)dt = 0$ and, in addition to certain continuity and existence conditions, it is assumed that

$$p^{(j)}(t) = o(e^{-at}) \quad (a > 0; j = 0, 1, 2).$$

E. FISCHER. *Das Zinsfussproblem der Lebensversicherungsrechnung als Interpolationsaufgabe*, pp. 205–307. A detailed account of the various methods available for the calculation of an isolated annuity value at a non-tabular rate of interest. The methods are grouped according to the use they make of ancillary tabulated values. In the last chapter the problem is re-considered from the point of view of interpolation (direct or osculatory) theory and some of the familiar formulae—Poukka, Palmqvist, Meidell, etc.—are derived as particular cases. A short numerical comparison of the various formulae concludes this valuable article.

H. WYSS. *Beobachtungen über die Sterblichkeit bei den Einzel-Kapitalversicherungen der Schweizerischen Lebensversicherungs- und Rentenanstalt*, pp. 309–345. An account of the mortality experienced in the ordinary and industrial branches of the Swiss Life Assurance and Annuity company during the years 1930–40. From the former (which included a small proportion of female lives) a graduated aggregate mortality table (RAH 1930/40) was prepared and used as a yardstick to measure the differential mortality under ordinary and industrial assurances, the effect of selection, sex differentiation (industrial only), and secular changes. There is also an analysis of the causes of death and a comparison with slightly earlier German and British experiences.

Mitteilungen der Vereinigung schweizerischer Versicherungsmathematiker,
Vol. XLIV, Part 2, 1944

P. NOLFI. *Zur Bestimmung der Ruckschlusswahrscheinlichkeit einer geschlossenen Gesamtheit*, pp. 217–220. The use of Bayes's postulate in connexion with the observation of r deaths among n lives.

I. JECKLIN. *Über den Zusammenhang zwischen gewissen Zusatzversicherungen, Prämienzerlegungen und Approximationen in der Lebensversicherungstechnik,* pp. 221–232. Notes on premiums for benefits added to basic policies in the form of riders. A suggestion of Cantelli leads to practical approximations of the form

$$a_{x_1 x_2 \cdots x_k \overline{n}|} \doteqdot a_{x_1 \overline{n}|} a_{x_2 \overline{n}|} \cdots a_{x_k \overline{n}|} / (a_{\overline{n}|})^{k-1}.$$

I. SCHÄRF. *Über partielle Bestandsänderungen und eine Klasse neuer Integrationsprozesse,* pp. 233–249. A new type of product integral leads to a more general theory of multiple decrement.

B. BAUMANN. *Die Todesursachen der Volksversicherten,* pp. 251–305. An investigation of the 1912–37 mortality by cause of death in the industrial branch of the Basle Life Company. It is found that the considerable mortality improvement between 1912–27 and 1927–37 is due almost entirely to decrease in tuberculosis. Selection in favour of the company is shown to have existed not only in total but also for mortality due to tuberculosis, cancer, and diseases of the circulatory system.

P. A. LEEPIN. *Über die Anwendbarkeit von Durchschnittsverfahren zur Bestimmung der Schadenreserve in der privaten Unfallversicherung,* pp. 307–361. Arguments in favour of estimating reserves in respect of unexpired health and accident claims by means of 'averaging'. An essential of the method is the estimate of the standard deviation, and thus of the 'risk reserve', of the result.

Mitteilungen der Vereinigung schweizerischer Versicherungsmathematiker,

Vol. XLVI, Part 2, 1946

H. KREIS. *Lineare Abhängigkeit und Äquivalenz von Punktsystemen,* pp. 169–186. It is proved that there are an infinite number of sets of three points which have regression lines identical with those determined by least squares from n arbitrary points: the three points forming any one set all lie on an ellipse. A similar theorem holds in three dimensions.

H. AMMETER. *Das Maximum des Selbstbehaltes in der Lebensversicherung unter Berücksichtigung der Rückversicherungskosten,* pp. 187–213. Swiss material is used to illustrate the practical application of collective risk theory. The maximum limit of retention is then considered with particular reference to the costs of reinsuring.

G. LUDWIG. *Eine Methode zur approximativen Berechnung der Werte temporärer Leibrenten,* pp. 215–230. Proposes two new formulae; one for the calculation of $a'_{x\overline{n}|}$ from $a_{x\overline{n}|}$, $q_{x+\theta}$ (fixed $\theta < n$), and pure interest functions at rates i and i'; and the other to obtain $a_{xy\overline{n}|}$ from $a_{x\overline{n}|}$, $a_{y\overline{n}|}$, $q_{x+\theta}$ and $q_{y+\phi}$ (fixed θ, $\phi < n$), and pure interest functions. The latter is rather less simple in application than Lidstone's approximation to $a_{xy\overline{n}|}$ based on $P_{x\overline{n}|}$, $P_{y\overline{n}|}$ and $P_{\overline{n}|}$ but is more accurate.

E. MICHALUP. *Über den Begriff 'Exzess' in der mathematischen Statistik,* pp. 231–236. Kaplansky showed in *Jour. Amer. Statist. Assoc.* 1945 that $\beta_2 > 3$ does not necessarily imply a frequency curve with a modal ordinate greater than that of the normal curve with the same standard deviation. It is here shown that Lindeberg's measure of kurtosis (*Skand. Akt.,* 1925) does not suffer from this disadvantage, at least in the examples chosen.

L. FÉRAUD. *Sur les formules de l'assurance invalidité*, pp. 237–244. After deriving a relation to connect the rates of (permanent) invalidity, mortality of active lives, mortality of invalid lives, and mortality of lives generally, the author shows that certain official Swiss tables are based on inconsistent formulae, the errors, however, being only of small practical consequence.

J.-P. ROBERT. *La détermination des excédents à réassurer dans l'assurance sur la vie*, pp. 245–271. An interesting paper on the maximum sum assured for retention written from a practical viewpoint. It is shown that strict theory applied to the conditions of practice would allow of high limits of retention even in small companies. The reinsurer's possible inability to make a margin of profit if the retention is too high sets a lower limit for the original company.

Mitteilungen der Vereinigung schweizerischer Versicherungsmathematiker,
Vol. XLVIII, Part 2, 1948

H. JECKLIN. *Approximierte Prämien gewisser Zusatzversicherungen*, pp. 81–84. A rough approximate formula is found for $P^2_{xy\overline{n}|}$ suitable for use when a widow's death rider is to be added to an endowment assurance on (x).

H. ZWINGLI. *Risikozuschläge und mathematische Reserve in Funktion des Verlaufes der Übersterblichkeit bei minderwertigen Leben*, pp. 85–107. The object is to measure the effect on extra premiums, policy-values, and paid-up values, of using, effectively, the numerical rating system in place of the true sub-standard mortality curve. The valuable numerical illustrations are based on six Danish sub-standard tables (for mild heart cases, serious heart cases, etc., respectively) but it would have been interesting to have seen figures for endowment assurance terms exceeding 20 years.

J. NEUHAUS. *Zur Berechnung von Übersterblichkeitszuschlagen*, pp. 108–115. Approximate formulae are obtained for the endowment assurance extra premiums required to support (i) a constant addition of a to q_x, and (ii) an addition to q_x decreasing linearly from α to 0 during the term of the endowment.

M. E. EISENRING. *Bemerkungen zu den Sterbetafeln von J. H. Lambert*, pp. 116–125. Historical notes on Lambert's (1772) contributions to graduation theory and practice.

H. JECKLIN and H. ZIMMERMANN. *Eine praktische Interpolationsformel*, pp. 126–144. Given 3 points on a monotonic curve a fourth may be interpolated by replacing the curve by a section of a hyperbola. The interpolate is then given by the simple formula

$$y_x = \frac{y_2(x_2-x_1)\,(x_3-x)\,(y_3-y_1)+y_3(x_3-x_1)\,(x-x_2)\,(y_2-y_1)}{(x_2-x_1)\,(x_3-x)\,(y_3-y_1)+(x_3-x_1)\,(x-x_2)\,(y_2-y_1)},$$

which gives good results when applied to interest and contingency functions.

(The five preceding articles were all written in honour of Dr C. Wiesmann's seventieth birthday.)

E. GÖRING. *Definition und Bestimmung der Wahrscheinlichkeit durch das Kollektiv allgemeiner Art*, pp. 145–170. A sequel to this author's article in *Trans. Twelfth I.C.A.* which Prof. A. Wald has severely criticized in *Mathematical*

Reviews. The idea is to extend the von Mises collective by definition rather than by operation on simple collectives to the case of varying probabilities with especial reference to the data of life assurance.

H. WYSS. *Erwägungen über abhängige und unabhängige Wahrscheinlichkeiten*, pp. 171–205. A detailed account of the Karup theory of dependent and independent decremental probabilities including recent developments.

E. ZWINGGI. *Bemerkungen zur Berechnung von kombinierten Übertritts- und Verbleibswahrscheinlichkeiten*, pp. 206–211. The probability of passing from state I to state II at age x and of thereafter surviving to age $x+1$ is given exactly by

$$\int_0^1 {}_tp_x^I \nu_{x+t} . {}_{1-t}p_{x+t}^{II} dt,$$

or approximately by

$$\left(1 - e^{-\int_0^1 \nu_{x+t} dt}\right)(1 - \tfrac{1}{2}q_x^I)(1 - \tfrac{1}{2}q_x^{II}),$$

or by

$$\left(1 - e^{-\int_0^1 \nu_{x+t} dt}\right)(1 - q_x^{II})(1 - \tfrac{1}{2}q_x^I + \tfrac{1}{2}q_x^{II}).$$

Numerical examples show that the approximations are very good except when q_x^I and q_x^{II} are of the order of ·1 or ·2.

P. NOLFI. *Über die Zerlegung einer Versicherungskombination*, pp. 212–219. Classifies decremental forces into two types depending on whether they do, or do not, appear in the survivorship probability which multiplies them. For example, the force of becoming disabled is of the first type when measured in terms of active lives but is of the second type when measured in terms of all surviving lives. This classification has certain consequences when judging whether, for example, invalidity premiums increase or decrease when mortality and morbidity both decrease.

H. RUCH. *Eine Variation der t-Methode*, pp. 220–231. See Jecklin's article reviewed in *J.I.A.* Vol. LXXIV, p. 353 for a description of the t method of valuing endowment assurances. It is here shown that weighting with q_x may lead to serious error with modern tables but that weights of the form $A \dfrac{N_x - N_{x+k}}{D_{x+k}} + B$, where A and B are suitably chosen constants and k is a medium duration, may be expected to give results closely approximating to the truth.

H. AMMETER. *Kollektive Reservenberechnung*, pp. 232–239. Describes and advocates the employment of the group method of valuation published by Renberg and Wilhelmsen in *Skand. Akt.* 1947 (see *J.I.A.* Vol. LXXIV, p. 150).

H. BURCKHARDT. *Neue Reduktionsfaktoren für die Krankengeldversicherung*, pp. 240–250. Frequency tables of recoveries from sickness are provided based on data from the canton of Berne in 1938–39. Males and females are separated and the ages are grouped decennially. Data from experiences in which benefits were limited to one year and three years are shown separately: a comparison is made with 'unlimited' figures obtained from the disability experiences of a Swiss pension fund and a Swedish insurance company.

S. VAJDA. *Introduction to a mathematical theory of the graded stationary population*, pp. 251–273. A stationary community is supposed divided into k stationary strata, entry into which is successive and dependent only on the length of time spent in the preceding stratum. Cp. E. Jones, *J.S.S.* Vol. VIII, p. 49.