denominated "ranula." This, like the encysted tumour, generally occupies some part of the cellular space under the tongue and between the rami of the lower jaw; it is gradual in its growth, and has a semi-transparent appearance. The origin of this disease can be dated from obliteration of the common orifice of the sublingual and submaxillary ducts; the discharge of saliva is thus checked and prevented, and there is a consequent accumulation in the duct, the secretion becomes inspissated, and mixed with the mucus poured out by the lining membrane of the canal, and in this way a tumour, sometimes of considerable magnitude, is produced. When it is practicable, some authors have recommended the introduction of a small probe into the mouth of the duct, and treat the constricted orifice by gradual dilatation, as in the cases of strictures of other mucous canals. In this way I have known the distended cavity to have become emptied, and a free exit established for the subsequent secretion of mucus to escape. When the orifice of the duct cannot, however, be re-established in this manner, the treatment of it by caustic potash is the best; or, if the tumour be a very large one, the excision of a portion of the mucous membrane, with the parietes of the cyst, may be substituted for simple incision. This is the method which I should advise you to adopt, but other plans besides these have been recommended. The nitrate of silver has been proposed, and will, I have no doubt, often succeed; its object is precisely the same as that of the caustic potash, that of destroying the cyst, but in this respect I rather believe that it is less to be depended upon than the kali purum. There is another mode of treatment which is sometimes adopted in these cases; it is one, however, which I feel it to be my duty strongly to caution you against—it is the introduction of a seton. A skein of silk, or part of one, is drawn through the substance of the tumour, and tied in a knot closely under the tongue. The object of this method of treatment is manifest; it is that of producing inflammation and consequent obliteration of the cyst. This is a very nasty mode of proceeding, independent of its being a very dangerous and inefficient one; I have seen it productive of great inflammation in all the surrounding parts, and attended with the severe symptoms which I enumerated to you in a former part of this lecture as occurring in this case, and I have never seen it cure the disease. The degree of feverish excitement and general disturbance of the whole system which I have seen attend this mode of treatment, would prevent my ever having recourse to it.

Besides the accumulation of saliva,

Earthy Deposits in the Salivary Ducts
under the tongue, principally formed of the

phosphate of lime, are often met with; they seldom produce any inconvenience, nor do they interrupt the flow of saliva, and perhaps they are not discovered until they become inconvenient from their size and magnitude in the mouth. I have removed several, and one a short time since from a girl who presented herself among the out-patients. This was of a larger size than any which has previously fallen under my notice, it was about the size of a horse-bean. There is of course no reason why they should not attain a much greater size than this. They may be removed by a very simple process. You have nothing to do but to divide the membrane of the duct with the point of a lancet, and you can then easily dislodge the calculus by means of the edged extremity of a probe; it will generally escape without any assistance, after the division of the parts. It, however, sometimes happens that the presence of a calculus in the ductus Whartoniensis is productive of considerable inconvenience to the patient, and escapes from the duct without operation. This occurred in a case (the preparation of which I now show you) which was given me by a friend some short time since with the following history. The patient had suffered for several years from pain and uneasiness at the inferior surface of the tongue, and from a painful spasmodic affection of the miglo-hyoideus muscle, the stone was discharged during the night from the duct, and all her former painful sensations immediately left her.

ON THE
LAWS OF SICKNESS,
ACCORDING TO AGE,

EXHIBITING A DOUBLE COINCIDENCE BETWEEN THE LAWS OF SICKNESS AND THE LAWS OF MORTALITY.

By T. R. EDMONDS, Esq., *late of Trinity College, Cambridge.*

THE law of mortality of any population, consists in the expression, for successive ages of life, of the number dying out of a given number living. Similarly, the law of sickness will express the number constantly sick at any age, out of a given number living at that age. The law of sickness, as will presently be seen, admits of a simple and precise definition; but it does not immediately inform us how many individuals at a given age are yearly attacked by sickness. This law has regard to the duration, and not to the number of cases of sickness suffered by a given number of individuals.

There have been published only two

observations on the law of sickness,—one from returns collected by the “Highland Society of Scotland,” the other from returns recently collected and just published by the “Society for the Diffusion of Useful Knowledge.” In the former, 85,000 years of life, in the latter, 24,000 years of life have been observed. The period of life observed, extended from the age of 20 to the age of 80 years; but for ages above 60, the results are not deserving of much confidence. In both observations, the quantity of sickness suffered by a given number living, increases with the age according to the same rate. *This rate of increase is identical with the rate of increase in the mortality according to age;* and is expressible by the number or “constant” which I have used in the construction of all my theoretical tables of mortality, between the ages of 15 and 55 years.

According to this new theory, the mortality at any year of age, exceeds that of the preceding year by 3(2.991) per cent; which is the same as saying that the mortality during any decennial interval of age, exceeds that of the preceding decennial interval by one-third-part (34.3 per cent.); or that the mortality doubles in 23½ years.

I now subjoin a table of the relative and absolute sickness at each age, as experienced in the Scottish and English benefit societies, together with the relative results according to theory. The absolute numbers for England have been extracted from an article in the *British Medical Almanack* for 1836, from the pen of the editor of that valuable work. The relative may be converted into the absolute numbers by using the common multipliers appended.

Between Ages . . .	Relative Sickness and Death.					Absolute number constantly Sick, & dying annually, out of 100 living.			
	20-30	30-40	40-50	50-60	Common Multiplier	20-30	30-40	40-50	50-60
Sickness { Scotland	.57	.67	1.00	1.83	1.97	1.13	1.32	1.97	3.60
{ England	.60	.71	1.00	1.69	2.56	1.54	1.83	2.56	4.32
Deaths . . . England	.51	.78	1.00	1.61	1.85	.95	1.45	1.85	2.98
Theory	.55	.74	1.00	1.43	—	—	—	—	—

On inspection of the above table of *relative* sickness and death, it will be perceived that for the three decennial intervals of age from 20 to 50, the coincidence between the theory and the observed facts is nearly perfect. Between the ages of 50 and 60 years there is an apparent, but no real opposition. For according to the theory of mortality, a new rate of increase begins, or a new constant comes into operation at some variable age between 50 and 60 years. The above theoretical numbers are founded upon the assumption that the new constant comes into operation at the age of 55 complete years. If an earlier age (say 53) had been adopted, the theoretical numbers would have agreed with the facts for England. In the case of Scotland, we have no information respecting the contemporaneous rate of mortality. In England, the elevated ratio of sickness between 50 and 60 years, coincides with the elevated ratio of mortality at the same age. The establishment of this coincidence between the law of sickness and the law of mortality is the main object of the present remarks.

The fact being acknowledged, that the sickness suffered by a given number living, increases with the age, according to the same law which regulates the increase of mortality, it necessarily follows—that there

exists a fixed proportion at every age between the quantity of sickness and the number of deaths. If there are two years of sickness to every death at any one age, the same proportion holds good for every age; at least between the observed limits of 20 and 60 years. According to the observation just made on English benefit societies, the constant proportion is that of one year and a half of sickness to each death at every age. From my own experience, I am inclined to the opinion, that two years of sickness to each death, is the proportion most generally prevalent. In the present inquiry, the exact amount of this proportion is a question of no importance; it is sufficient to know, that all observations (including a third unpublished extensive observation of mine) agree in showing this proportion to be constant at all ages.

Adopting as true the simple proportion of two years of sickness to each death, we obtain the following interesting consequences. If out of 100 living at any age, 4 are constantly sick, then it may be assumed as a fact, that the annual deaths will be two in number; and reversely. If at any age, the proportion of sickness to each individual, amounts to the 2½th part of a year, the mortality in one year will amount to one in *fifty*. If at any age, the mortality

in one year is represented by *one* per cent of the living, the sickness due to each individual will be *one week*, which is nearly *two hundredth* parts of a year. The reader may easily trace similar consequences from adopting any other constant proportion than that of two years to each death.

Four years ago, I published some tables of health insurance, founded upon the principles above explained. The observation of the "Highland Society" was at that time the only one extant, on which the graduation of sickness according to age could be founded. I considered that great confidence might be reposed on the correctness of the relative results obtained from this observation, more especially as they were in harmony with the theory of mortality. But I entertained strong suspicions as to the correctness of the absolute results; and I felt persuaded, that the absolute sickness therein expressed, was very much less than that generally prevalent in England. In my published health tables, the scale of relation is that exhibited by the English and Scottish observations, or rather is that of the theory with which they so nearly coincide. But I have adopted for the base of my tables, a number which is more than 50 per cent greater than that of the table of the "Highland Society," and 20 per cent greater than that indicated by the English observation just published. The additional experience which I have since acquired, has served to confirm the opinion which I first hazarded respecting the *absolute* sickness most generally suffered by the English population. The results of my theoretical tables do not substantially differ from the results of Dr. Price's tables of sickness, which have been in universal use for fifty years. But every two successive numbers in my tables, bear the exact same relation to each other, which is not the case in Dr. Price's tables.

All my tables of life and health insurance

may easily be distinguished from the tables of any other person by the "constant" connecting together any two successive numbers. For example, at page 28 of my "LIFE TABLES," I have given the values at every age, of a life insurance of £100 for one year, deduced from the table of "Village Mortality," which is a theoretical table founded on Dr. Heysham's observation at Carlisle. At the ages of 20 and 21, the values are .6529 and .6724 respectively; at the ages of 30 and 31, the values are .8757, and .9018 respectively. The reader will easily perceive that the excess in each case is measured by the constant 2.99 per cent. Under the age of 55, for every ten years increase of age, the "Premiums for one year" increase *one third* part, very nearly.*

ON THE MORTALITY AT EACH AGE OUT OF A GIVEN NUMBER OF CASES OF SICKNESS.

Within the last few days, I have met with an extensive observation lately published by Dr. Southwood Smith, Physician to the *London Fever Hospital*, which brings the new theory of mortality, and the chief of its three constants, in close apposition with therapeutics and the practice of medicine. By means of this theory, when the number dying out of a given number living is known

* The reader may learn with some surprise that this new theory of mortality has been already extensively applied to practice, and has served as the basis of pecuniary engagements of great magnitude. For more than six years this theory has been the regulator of all the published lists of prices offered by a London Life Insurance Company, as may be seen by the annexed comparative table. The numbers in the first and second columns are in the exact proportion of 6 to 5 to the original numbers in the third and fourth columns:—

Age.	Annual Premium for Insurance of 100 <i>l.</i> according to			
	The Advertisements in 1830, and the Prospectus in 1836, of the same Life Office.		My Theoretical Table B 24, published in 1832.	
	For One Year.	For Life.	For One Year.	For Life.
	£ s. d.	£ s. d.	£	£
20	0 15 8	1 11 9	.6529	1.3222
30	1 1 0	2 2 0	.8757	1.7493
40	1 8 2	2 17 1	1.1741	2.3776
50	1 17 9	4 2 0	1.5731	3.4159
60	3 5 4	6 10 9	2.7225	5.4459
70	6 18 4	10 18 6	5.7655	9.1041

at any one age, the mortality at every age of life is also known. By means of the same theory, as I have proved above, the relative quantity of sickness suffered at each age of life is also known. The constant of mortality is identical with the constant of sickness; the same number which measures the increase of mortality according to age, measures also the increase in the quantity of sickness suffered by a given number of individuals. The new observation proves that the same constant, in the case of fever, measures the increase of deaths according to age, out of a given number attacked. It appears in the highest degree improbable, that this number, of all others, should regulate the mortality in fevers, without being at the same time applicable to other extensive classes of disease. The materials for the decision of this question abound or ought to abound in all public hospitals.

The observation of Dr. Smith is founded upon 6000 cases of fever occurring during the ten years ending in January, 1834. I subjoin the results in the form in which they have been published. I have added for comparison a column containing the numbers resulting from the theory, or from an increase of one third part (34.3 per cent) for every ten years increase of age.

Between Ages.	Out of 100 attacked by Fever, there die according to	
	Fact.	Theory.
5—16	8.3	—
15—26	11.5	12.5
25—36	17.1	16.8
35—46	22.0	22.6
45—56	30.5	30.3
55—66	40.7	40.7
Above 65	44.6	—

The coincidence between the facts and the theory is sufficiently close to prove all that is required. The small existing variations might have appeared, even if the coincidence had been perfect at intervals of five years of age. The theoretical numbers are founded on the assumption that the cases were equably distributed over each decennial interval of age, of which no evidence is presented. Dr. Smith has omitted to state the absolute numbers at each age on which his results are founded. The facts were probably very deficient in number at the beginning and at the end of his table; so that the results here are entitled to little confidence. The information would have been complete if he had given his materials distributed in quinquennial gradations of age. In the column of ages Dr. Smith has adopted an erroneous form of expression;

instead of "between the ages of 15 and 26," he evidently intended to say, between the ages of 15 and 25 complete years, which is the form generally adopted.

If it be admitted that the aggregate of severe diseases resemble fevers in their fatality according to age, we are led to the following novel but inevitable conclusions, applicable between the limits of 15 and 60 years of age. That a given number living at every year of age suffer the same number of attacks of sickness; and that the duration of each case of sickness at any age, is proportional to the mortality at that age. The deaths out of a given number living, vary with the age, in precisely the same degree as the deaths out of a given number attacked; consequently, the proportion between the number living and the number attacked is constant. The proportion of sickness (in duration) to the number of deaths has been proved to be constant at every age. And since the number of cases of sickness (out of a given number living) at each age is constant, the average duration of each case must be proportional to the number of deaths out of a given number living, that is, to the mortality. Assuming that one tenth part of the living at every age are yearly attacked by sickness, the facts above announced may be thus illustrated. If 1000 living at the age of 20 suffer 100 attacks of sickness, 10 deaths and 1000 weeks of sickness; then 1000 living at the age of 43, will suffer 100 attacks of sickness, 20 deaths, and 2000 weeks of sickness.

If it be confirmed by future observation, that diseases in general are subject to the same law as fevers, the knowledge of the new theory of mortality will form an indispensable branch of medical education. (This theory has been explained and applied in Nos. 605, 614, 640, 641, and 648 of THE LANCET.) Without this knowledge it will be impossible for a medical man to form any correct idea of the value of different remedies, when his patients differ in age. This theory will inform him that if he loses by death double the proportion of patients at the age of 43 than at the age of 20, the effect of his remedies in each case is the same.

46, Regent-square, London;
13th Feb., 1836.