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PUBLIC HEALTH MAGAZINE.

VOL. I.] APRIL, 1876. [No. 10.

Original Communications.

VENTILATED HOUSE DRAINAGE.

(A paper read before the Citizens' Public Health Association.)

BY JAMES H. SPRINGLE, ARCHITECT, C.E.

Mr. President and Gentlemen,—In resuming the discussion of ventilated house drainage this evening, I think, Mr. Chairman, it is proper to state, that the introduction of the present system of water supply to cities and towns, has, during the last thirty or forty years, wrought a radical change in the disposal of the water waste, refuse and excreta of dwellings. Formerly, the privy pit and dust heap received the waste and house refuse, and when these had accumulated and fermented until they could be endured no longer, then, at a heavy expense and great discomfort, they were removed, and the process of accumulation recommenced.

With the advent, however, of water works and underground sewerage, this mode of disposing of our house waste and refuse has been changed, and now nearly all such matters are removed by water carriage in tubular drains, from the house to the common sewer, and from thence to the river, — the quantity thus discharged in Montreal, exclusive of rainfall, being about eight million gallons per day.

Now, we find that this sewage, from a variety of causes which we cannot at this time consider, becomes stagnant; it ferments, and evolves poisonous gases; and the sewers themselves, from their mode of construction, will, as they become older, grow more foul and offensive, and the effluvia from them must increase

rather than diminish. Yet it is into these same sewers that the drainage of our dwellings, shops and factories must be discharged. It is therefore of the utmost importance, while disposing of our drainage, to secure ourselves against the poisonous effects of gases which are being constantly generated in the sewers which receive it.

In addition to this, it must be borne in mind that all who adopt the modern water closet system for removing the soil and water-waste from their buildings, necessarily introduce directly into said buildings a tubular branch of the street sewer, and in the case of dwellings, this branch in most instances is carried up and terminates in the immediate vicinity of the sleeping apartments, where it is connected with the water closet, bath, wash-stands and sinks of the building. Sometimes these connections have air traps to prevent the passage of sewer gas through these conveniences, and sometimes—as is the case with many houses in Montreal—these air traps are omitted altogether, and sewer gas has, in consequence, free, unimpeded entrance to the apartments. But even with air traps, by this arrangement of the drain or soil pipe, very little protection is obtained from the evil effects of sewer gas, because no means are provided for relieving the soil pipe from the pressure of the column of sewer air which, by its levity, is constantly pressing upon and forcing itself through the air traps. It is not surprising, therefore, that all houses having water closet arrangements *of this* kind should be constantly troubled with effluvia from the sewers.

Now, there are two plans which are eminently superior to all others for making use of this branch sewer or soil pipe for all the purposes above mentioned, in such a manner as to avoid poisoning the air of the building in which it is placed with sewer gas.—One of these plans was described by Professor Godfrey at the last meeting. The other has been described by myself in the PUBLIC HEALTH MAGAZINE. By the first of these plans, as Professor Godfrey explained to you, the branch sewer is carried directly up through the building to the roof, without air traps or obstructions of any kind. The strong updraught of sewer air through this pipe will, it is contended by the learned professor, not only ventilate the sewer with which it is connected, by discharging its

gaseous contents into the atmosphere above the roof of the building, but, in addition, the water closet, bath, wash-basins and sinks, may be directly connected with the sewer pipe, without any necessity for the intervention of air traps to such connections, while the rainfall of the roof will flush the pipe and keep it clean.

The advantages of this plan, especially in its simpler form of water shaft and ventilator, are not matters of conjecture; it has been tested in a number of buildings in Montreal and found to answer admirably, when it is properly constructed and the necessary precautions have been taken to ensure success. Several of these precautions were mentioned by Professor Godfrey at last meeting, and I will refer to them again further on. So satisfactory has the plan proved in the great majority of cases, that Mr. Alderman McLaren proposes to make its general adoption compulsory on all who may build hereafter, and has given notice of motion in the City Council to the following effect: "That every building to be erected hereafter within the city limits which shall have any connection with public or private drains, that is to say, such connections as sinks, wash-basins, baths or water closets, shall have a conductor or conductors suitable in size in proportion to the roof to be drained, without any trap or hindrance, leading direct up through said building to the roof, and also that all water closets, baths, etc., shall be connected with such conductor, *duly trapped*, so that no sewer gas can escape into any apartment of the house, but must past direct up through such conductor, leading out at the roof of such building."

As was clearly shewn at the last meeting, by Professor Godfrey, immunity from the noxious effects of sewer gas, depends, by his plan, entirely upon the strength of the upward current from the sewer to the roof, being much greater than any check draught, or counter current, it may meet with on its course. Alderman McLaren, however, seems to have some misgivings as to the constancy or superior strength of this upward current; hence he is careful to stipulate that all house connections with this branch sewer or soil pipe, shall be "duly trapped," and the stipulation is, in my opinion, a very proper one.

It becomes necessary, however, before any such plan as this is

made obligatory, to prove beyond question that it is of universal application; for if it is not, or if its general adoption might lessen its efficiency, any municipal regulation might do more harm than good, and be only adding another to the list of inoperative by-laws which already encumber the Corporation Statute Book. We may form some idea of the dependence to be placed on the general uniform strength of this upward current of sewer gas, by considering, for example, the variable effect of the almost endless forms of house roofs: the diversified heights and relative positions of buildings to each other in a city; or the widely differing circumstances and conditions under which these soil pipes or branch-sewers would connect with the common sewer on the one hand, and with the water service and ejecta of dwellings on the other; and if to these we add the disturbing effects which would be caused by the different directions and force of the wind on the sewer outlets and street water shafts, it will, I think, be evident that the upward current of air in these branch sewers must, in many cases, be very irregular and uncertain. Moreover, it is difficult to see how such pipes can be free from the other contingencies which affect all draught pipes or flues that can only operate by virtue of the levity of the air passing through them, or, to some extent, by the warmth of the building in which they are placed. We know that the updraught in such pipes may be retarded, or rendered stationary, or even converted into a downdraught, by a mere change in the direction of the wind, or by the different heights of buildings; such results are often seen, also, even in flues and pipes which are heated by fire, and I have known intense cold to produce the same effect.

If, for example, we take two adjoining houses each having this ventilated drainage. One of them is two stories, the other four stories high. The drain pipes of both are connected with the common sewer and within a short distance of each other. A gust of wind, or, in fact, any slight disturbance of the air in the sewers or on the roofs, would cause the longer column of air in the four-story house to control and reverse the current in the two-story house, and thus an air syphon would be formed, which would maintain a continuous down-draught in the latter house and

completely upset its ventilation. Or again, if a strong wind were blowing against the gable of the tall house, or from the roof of the same down upon the roof of the two-story house, this would also disturb the up-draught of the latter house and stop its ventilation, until a change took place in the direction of the wind. What, again, would be the effect of a whole street of houses, many of them of different heights, and both sides of the street drawing from the same sewer? And this sewer having a number of street water-shafts, besides! It is certain that the draught pipes of some of these houses would have such a strong current as must greatly modify if not entirely prevent any up-draught in the others, while the relative position of the water-shafts would accelerate the up-draught in some houses and retard it in others. Moreover, in a city circumstanced as Montreal is, with some portions of it two hundred feet or more above the others, it is clear that the up-draught of sewer gas would be much stronger—other things being equal—in the higher situations than in the lower ones, and thus the uptown parts of the city might draw to themselves the greater part of the gas and effluvia generated in the city sewers, while in the lower parts of the city, the ventilating drain pipes would cease to operate, simply from want of gas, and thus the different heights of the city would form another means of disturbing the contemplated uniformity of the up-draughts of sewer-air, by flooding the high levels with it, and depriving the lower levels of their fair share of this ventilating commodity.

Now let us examine these low level parts of the city from another point of view. The crown or top of the large brick tunnel in Craig street, from the foot of St. Antoine street to Viger Garden, is about sixteen feet above the ordinary level of the river, and the sewerage of St. Ann's Ward and the Craig street valley is about the same level. The spring and fall floods usually rise sufficiently high to completely fill these sewers and tunnel with water; at such times, therefore, all the gas in these sewers must be forced into the ventilating drains of the houses, or through the water-shafts of the streets, or else, as is most likely, be forwarded to the higher levels of the city, and accumulated there to a dangerous extent, especially during the fall floods, when the street

water-shafts are stopped with snow. However this may be, it is quite clear that all movement of gas in the ventilating drain pipes of these parts of Montreal must cease, and the plan, so far as ventilation is concerned, remain inoperative as long as highwater lasts.

I think I have cited illustrations enough to show that, while this plan will operate successfully in many, or even in most cases where the conditions necessary for success can be complied with, yet the universal adoption of it might, nevertheless, for the reasons just given, prove the principal cause of its failure.

Of the conditions requisite for success when the locality and circumstances are favorable, I wish to say a word. One of the most important of these, is the proper arrangement and best means of constructing and supporting this conducting pipe, which has to perform the several services of water conductor, sewer ventilator, and ventilated house drain. It must be obvious, therefore, that the greatest care is required, not only to prevent any settlement of the pipe itself, but also to prevent its continuity and tightness from being deranged by any settlement of the building in which it is placed, for while there may be cases such as those described by Professor Godfrey, at the last meeting, where the up-draught of sewer-air through the drain pipe will be so strong as to render traps unnecessary, for the same reason a few holes or imperfect joints in the pipe would, in such cases, be of no importance, but rather beneficial than otherwise, as helping to ventilate the premises, but in other cases, where the up-draught is not so strong, or may scarcely exist, such imperfections as these, and connections without traps, would be fatal to the success of the plan.

There is also some difference of opinion as to the best material for these drain pipes. Some insist that cast iron is the most suitable; but it parts with heat so copiously, that it is apt to freeze the water passing through it, otherwise it is well adapted for the purpose, especially if it is well coated inside with hot coal tar. Professor Godfrey has used, and strongly recommends, the ordinary glazed earthenware drain pipe, and it certainly is not so liable to freeze up as a metal pipe, but it requires careful construction to prevent the joints from being dislocated by unequal pressure,

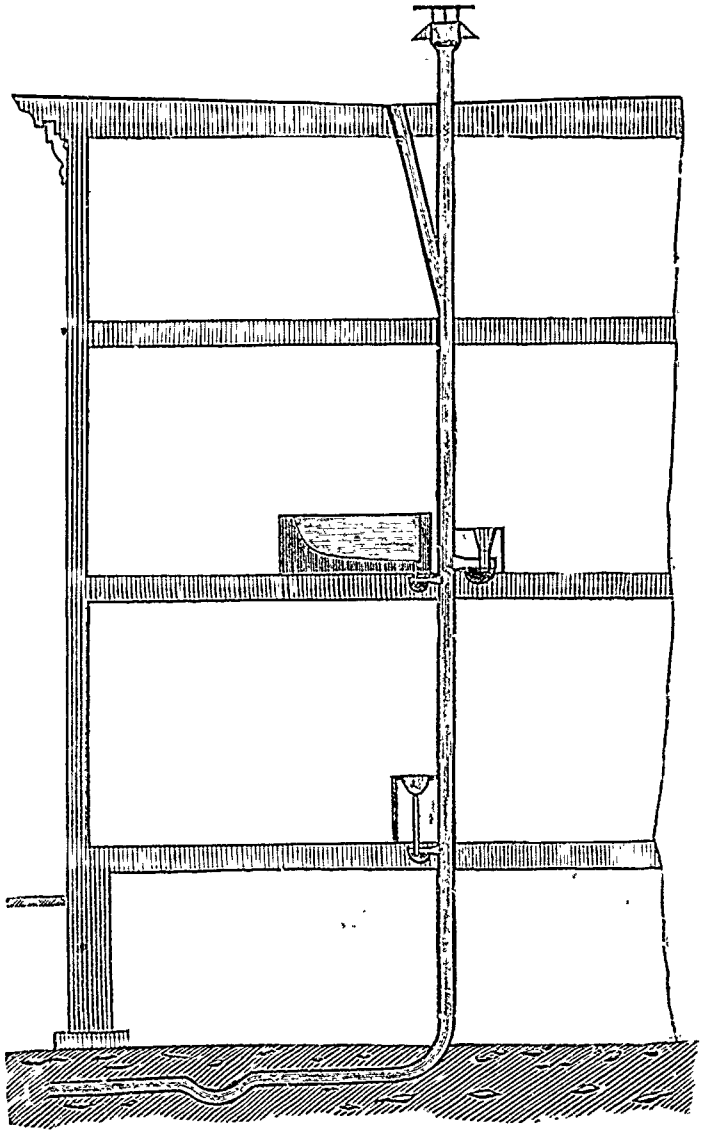
and especial care is necessary to prevent settlement and fracture at the junction with the horizontal pipe leading to the sewer.

Finally, it is essential to the success of this plan to have a cold roof, or the pipe will become choked with ice. How this may be accomplished was explained very clearly by Professor Godfrey at the last meeting. But I think if proprietors could be induced to go to the additional expense, it would be more satisfactory to extend the space mentioned by the learned professor into an entire attic story between the roof covering and the warmed apartments of the house. This attic story should be arranged to commence just below the eaves cornice of the roof, and may be a mansard or any other form of attic in common use. To the great utility and convenience of an attic story to a dwelling, all householders will bear witness; nor would there be in such case any necessity for having openings for the passage of cold air, as is essential in the sub-attic described and recommended by Professor Godfrey.

I will now, Mr. President, briefly describe the second plan of ventilated house drainage proposed by myself and fully set forth and explained in several numbers of the PUBLIC HEALTH MAGAZINE. By referring to the diagram, * you will notice that there is a general resemblance to the plan exhibited at the last meeting by Professor Godfrey. Both connect in the same manner with the common sewer, and both continue up through the building to the roof; but in this plan we start at the outset with the intention of trapping and preventing by all possible means the passage of gas and effluvia into the building from the common sewer; but whatever gas or effluvia may be generated *in* the house drain or soil pipe, or may be accidentally forced through the air traps, that amount and that alone is carried up the drain pipe and ejected above the roof into the atmosphere.

Here, then, is an essential difference between the two plans; by the first, a column of sewer gas is brought into the building and carried up to the roof, without trap or hindrance of any kind to serve the purposes already described; by the second plan, gas from the sewer is not allowed to enter the building at all. By the first plan, the gaseous contents of the sewer are transferred

* See next page.



PLAN OF VENTILATION FOR HOUSE DRAINAGE.

to the roof to be dispersed by the wind; by the second, no such transfer of gas is contemplated or can take place, and as the only gas to be removed is either generated in the drain pipe or forced through the traps, the quantity ejected must be far too small to cause either inconvenience or danger. I think, therefore, in view of all that has been said on the subject, that the first plan is worthy of extensive, *but not universal adoption.* For, in addition to the reasons already given for coming to this conclusion, it is quite certain that there are many citizens who will strongly object to having a current of sewer gas passing constantly up through their dwellings for the sake of ventilating the public sewers, or even for removing the water-waste and ejecta of their closets, bath-rooms and bed-chambers: but who will, on the contrary, prefer to have such sewer gas disposed of by passing it *through fire!* instead of having it left to be the sport of the winds on the housetops.

I now beg to draw your attention to the manner in which these drain pipes terminate on the roofs of buildings. By the first plan, the pipe just comes to the roof surface, so as to receive the water drip, and it is not found necessary or desirable to have any covering over it. By the second plan, if the roof is intended to drain to the centre, the drain pipe is divided into two branches as shown on the diagram. One of these terminates at the surface of the roof, similar to the first plan, to receive the water drip; the other is carried up some three feet above the roof and finished with a Tredgold ventilator, or ejector, as it is sometimes called. Of this ventilator, it may be well to say that it was first introduced by the late Thomas Tredgold, some sixty years ago, and was afterwards patented in the United States under the name of "Emerson's Ventilator." I had an old one removed from a building in St. James street in 1843, which was an exact counterpart of Tredgold's, and must have been put up shortly after his treatise on warming and ventilation was published. This ventilator is equally efficient under all directions of the wind, and is by far the best that was ever designed for this purpose. In order to meet any possible objection about effluvia on the roofs of buildings, this ventilator is shown on the diagram with a charcoal deodorizer.

By the arrangement here shown, this second plan of ventilated house drainage is applicable to all forms of roof, whether the rainfall runs to the centre or to the eaves. The warmth of the building will, in connection with the ventilator, maintain a constant up-draught in the drain pipe, which will always remove all pressure of gas from the air-traps, and clear the pipe of gas or effluvia.

You will also observe that the water-closet connection with the drain or soil pipe is in this case different from those in common use. Instead of the S trap, which was shown at the last meeting, this is what the plumbers call a D trap. You will notice by this arrangement that the direct continuity of the drain pipe is maintained, which facilitates the ventilation, and does not affect the free passage of water from the roof, while the D trap itself has the exit pipe so arranged as to prevent any accumulation of gas which might be generated in the trap in the event of the closet being unused for any time.

In conclusion, these two plans which have now been described to you, comprise all that is requisite for securing the properly ventilated and permanently efficient drainage of buildings; and while I consider the second plan described in the PUBLIC HEALTH MAGAZINE to be eminently suitable for all classes of buildings and under all circumstances, I do not intend or wish to detract from, or make light of, the many advantages which are obtainable by the first plan, so ably advocated by Professor Godfrey and Alderman McLaren, although the latter plan is certainly more restricted in its application, and might, if its general adoption were made compulsory in large cities, cause hazardous accumulations of sewer gas. I don't think, however, it would be advisable to have either of these plans made compulsory by any municipal enactment. Let the choice of plan, after a full examination has been made of the locality and circumstances, rest with the architect or proprietor. Then, the essential and paramount requirement, is: to have the drainage of all buildings from the connection with the street sewer to the termination on the roof, executed under the strict supervision of competent inspectors, armed with municipal authority to enforce the

execution of their instructions. Nor should the drainage of any building be allowed to go into operation until a certificate has been granted by the inspector that such drainage has been properly executed, and is fit for use.

Unless some such plan of supervision as this is adopted, house-drainage will continue to be what it is in most cases now—a miserable sham and delusion. Bad plumbers' work will continue to be covered up by the carpenter, and will only become manifest by stained walls and ceilings, by sewer-gas and effluvia, or by the outbreak of disease. Montreal will continue its evil reputation as one of the great centres of preventible mortality, a reputation the more to be deplored from the fact that its natural position and surroundings justly entitle it to become the model city of America in the matters of house-drainage and public sewerage.

Montreal, Feby. 12th, 1876.

NOTE.—Previous to 1860, MR. Morris, an English architect, had, in a dwelling house, carried up the soil pipe of the closet to receive the water of the roof, and found the arrangement satisfactory in ventilating all the drains of the house.

SYNOPSIS OF METEOROLOGICAL OBSERVATION FROM McGILL COLLEGE OBSERVATORY.

Barometer readings reduced to sea-level and temperature of 32° Fahr. † Pressure of vapor in inches mercury. ‡ Humidity, relative Saturation, 100. § Observed. Ten inches of snow is taken as equal to one inch of water.

Mean temperature of month, 14.57. Mean of maxima and minima temperature, 14 25. Greatest heat was 41.2 on the 7th; greatest cold was 15.4 below zero on the 5th,—giving a range of temperature for the month of 56.6 degrees. Greatest range of the thermometer in one day was 46.2, on the 6th; least range was 9 5 degrees on the 15th. Mean range for the month was 17.5 degrees. Mean height of the barometer was 30.0062. Highest reading was 30.989 on the 5th. Lowest reading was 28.766, on the 15th, giving a range of 2.223 inches. Mean elastic force of vapor in the atmosphere was equal to .077 inches of mercury. Mean relative humidity was 77.5. Maximun relative humidity was 100 on the 3rd. Minimum relative humidity was 42 on the 4th. Mean velocity of the wind was 15.6 miles per hour; greatest mileage in one hour was 51 on the 2nd. Greatest velocity was 60 m. p h. on the 2nd. Mean direction of the wind, West. Mean of sky clouded was 54 per cent. The extreme barometer readings for this month are the highest and lowest recorded here for many years. The maximum velocity of wind is also the greatest known for several years.

Rain fell on 4 days. Snow fell on 15 days. Rain or snow fell on 16 days. Total rainfall, 1.12 inches. Total snowfall, 27.5 inches. Total precipitation in inches of water, 3.87.

Sanitary Reports.

MORTALITY OF THE CITY AND SUBURBS OF MONTREAL, FOR FEBRUARY, 1876.

Class.	Order.	Diseases.	Total by Sex. Male.	Female.	Total both Sexes.
I ZYMOTIC.	I. Miasmatic.	1. Small Pox	18	12	30
		2. Measles	1		1
		3. Scarlatina	10	6	16
		4. Diphtheria		2	2
		5. Quinsy			
		6. Croup	6	2	8
		7. Whooping Cough	5	1	6
		8. Typhoid Fever, (Infantile Remittent Fever)	5	4	9
		9. Typhus, and Infantile Fever			
		10. Relapsing Fever			
		11. Continued Fever	1	4	5
		12. Erysipelas			
		13. Metria, (Puerperal Fever)			
		14. Carbuncle			
		15. Influenza			
		16. Dysentery		1	1
		17. Diarrhœa	2	1	3
		18. Pyœmia		1	1
		19. Cholera Infantum			
		20. Cholera			
		21. Ague			
		22. Remittent Fever			
		23. Cerebro-Spinal Meningitis			
	II. Enthetic.	1. Syphilis			
		2. Hydrophobia			
		3. Glanders			
	III. Dietetic.	1. Privation			
		2. Purpura and Scurvy			
		3. Delirium Tremens } Alcoholism	1		1
		4. Intemperance }			
	IV.—Parasitic.	1. Thrush			
		2. Worms, &c.			
II. CONSTITUTIONAL.	I. Diathetic.	1. Gout	1	1	2
		2. Rheumatism			
		3. Dropsy and Anæmia	2	3	5
		4. Cancer		1	1
		5. Noma (or Canker)			
		6. Mortification			
	II.—Tubercular.	1. Scrofula			
		2. Tabes Mesenterica			
		3. Phthisis (Cons. of Lungs)	17	12	29
		4. Hydrocephalus	2	3	5
		Carried forward	71	54	125

MORTALITY OF THE CITY AND SUBURBS OF MONTREAL.—(*Con*).

Class.	Order.		Diseases.	Total by Sex. Male.	Female.	Total both Sexes.
			Brought forward	71	54	125
III. LOCAL.	I. Brain and Nervous System.	1.	Cephalitis	5	1	6
		2.	Apoplexy	1		1
		3.	Paralysis		3	3
		4.	Insanity			
		5.	Chorea			
		6.	Epilepsy			
		7.	Tetanus			
		8.	Convulsions	16	6	22
		9.	Other Brain diseases, &c.	13	4	17
	II. Organs Circulation.	1.	Carditis, Pericarditis and Endocarditis		1	1
		2.	Aneurism	1		1
		3.	Other Heart diseases, &c	3	11	14
	III. Respiratory Organs.	1.	Epistaxis			
		2.	Laryngitis and Trachitis			
		3.	Bronchitis	8	10	18
		4.	Pleurisy			
		5.	Pneumonia	12	6	18
		6.	Asthma			
		7.	Other Lung diseases, &c.	2	4	6
	IV. Organs of Digestion.	1.	Gastritis	1		1
		2.	Enteritis	5	1	6
		3.	Peritonitis		1	1
		4.	Ascites			
		5.	Ulceration of Intestines			
		6.	Hernia			
		7.	Ileus and Intussusception		1	1
		8.	Stricture of Intestines			
		9.	Fistula			
		10.	Diseases of Stomach and Intestines, &c.	1		1
		11.	Pancreas Diseases, &c.			
		12.	Hepatitis		1	1
		13.	Jaundice		1	1
		14.	Liver Disease, &c	2	2	4
		15.	Spleen Disease, &c.			
	V. Urinary Organs.	1.	Nephritis	1		1
		2.	Ischuria			
		3.	Nephria (Bright's Disease)	2		2
		4.	Diabetes			
		5.	Calculus, (Gravel, &c)			
		6.	Cystitis and Cystorrhœa			
		7.	Stricture			
		8.	Kidney Disease, &c.			
	VI. Generative Organs	1.	Ovarian Disease			
		2.	Disease of Uterus, &c.			
	VII. Organs of Locomotion	1.	Arthritis			
		2.	Joint Disease, &c.			
			Carried over	144	107	251

MORTALITY OF THE CITY AND SUBURBS OF MONTREAL.—(*Con*).

Class.	Order.		Diseases.	Total by Sex. Male.	Female.	Total both Sexes.
			Brought over.....	144	107	251
V. VIOLENT DEATHS. IV. Developm'tal Diseases	VIII, Integum'ta'y System.	1.	Phlegmon	1		1
		2.	Ulcer		1	1
		3.	Skin Diseases, &c			
	I. Of Children.	1.	Stillborn	3	5	8
		2.	Premature Birth	7	2	9
		3.	Infantile Debility	33	50	83
		4.	Cyanosis			
		5.	Spina Bifida and other Malformation			
		6.	During Dentition	3	2	5
	II. Of Wom'n	1.	Paramenia			
		2.	Childbirth			
	III Old People.	1.	Old Age	5	5	10
	IV. Of Nutrition.	2.	Atrophy and Debility	1	3	4
	I. Accident & Negligence.	1.	Fractures, Contusions, Wounds			
		2.	Burns and Scalds			
		3.	Poison			
		4.	Drowning			
		5.	Otherwise	3		3
	II Homicide.	1.	Murder, Manslaughter			
		2.	Execution			
	III. Suicide.	1.	Wounds			
		2.	Poison			
		3.	Drowning			
		4.	Otherwise			
	IV.	1.	Chirurgici		1	1
			Total	201	176	377

FOREIGN HEALTH STATISTICS.

United Kingdom of Great Britain, during four weeks, ending Jan. 22nd, 23,954 births and 12,353 deaths were registered in London and twenty other large towns, and the natural increase of the population was 7,601. The mortality from all causes was per 1,000. In London, 25.25; Edinburgh, 25.50; Glasgow, 28.75; Dublin, 32.50; Portsmouth, 21.75; Norwich, 24.25; Wolverhampton, 24.75; Sunderland, 19.50; Sheffield, 26.75; Birmingham, 26.75; Bristol, 29.25; Liverpool, 32.50; Salford, 36.25; Oldham, 36; Bradford, 25; Leeds, 24.50; Hull, 28; Newcastle-upon-Tyne, 26.50; Leicester, 22.25; Manchester, 33; Nottingham, 26.25. Other foreign cities at most recent dates, per 1,000: Paris, 30; Rome, 36; Vienna, 29; Brussels, 26; Berlin, 24; Hamburg, 24; Calcutta, 42; Bombay, 29; Madras, 36; Amsterdam, 27; Rotterdam, 29; The Hague, 26; Christiana, 35; Breslau, 26; Buda Pesth, 43; Turin, 29; Alexandria, 41; Copenhagen, 27; Munich, 23; Naples, 39.—*The Sanitarian.*

CITIZENS' PUBLIC HEALTH ASSOCIATION,

A meeting of the Citizens' Public Health Association was held in the rooms of the Natural History Society, on Friday, the 3rd of March. Mr. Mercer in the chair.

Mr. Springle read a paper on House-sewer Ventilation, which will be found in our original communications.

Dr. Rourk said:—I have listened with a great deal of pleasure to the paper read by Mr. Springle, which certainly conveys a great deal of information, and he has struck upon certain ideas which have, I think, been neglected up to the present time. One of the first objections, however, which I have to that system is this, that the roof inclines to the centre, leaving it in a funnel shape, and in summer, when the heat in our rooms is, oftentimes, greater than what it is in the sewer, no ventilation can take place; another objection is, that the descending water from the accumulation of rain, etc., would have a tendency to produce a vacuum and leave the traps open, so that the next rush of sewer gas would enter the house. Dr. Rourk mentioned one or two other objections of less importance, and said he feared that the pipes would freeze in the winter, and then the ventilation through the shaft would be stopped. I have advocated a system of my own, of which a full description will be found in the PUBLIC HEALTH MAGAZINE for March, and my plan has been approved of by the first engineering authorities, among whom I may mention Walter Shanly. The other names you will, however, be able to see as the list will soon be published.

Dr. Godfrey then addressed the Chairman, saying:—Theories are very good in their way, but, frequently the finest theories do not turn out correct. But speaking from experience, I say that the draft is greater in summer than in winter. Another particular feature in connection with this plan of Mr. Springle's, is the trap in the basement. If you put this trap, the whole thing becomes a failure; you remove the hot-air and the hoar frost gets in and freezes up the pipes. Is it not much better for the citizen to have the foul gases from the sewer taken up through the house than to have it rise from the gully and enter his house through the open windows? For houses ventilated on this system you must have a free current of air passing through the roof. All flat roofs are worthless unless ventilated. I admit that some buildings are higher than others, but the same laws that govern smoke govern the draft in these shafts.

Ald. McLaren said:—We know that there are sewer gases, and we wish to prevent them from entering our houses; but we cannot do it, and why? because the termination of our sewers is

in our houses, but this is obviated by simply carrying the sewer-pipe right up through the roof, and if the heat is sufficient to melt the snow upon the roof the thing cannot freeze anywhere else.

Mr. Robb then rose and criticised pretty severely one or two points of Mr. Springle's paper, as well as some remarks made by other gentlemen present, saying:—"I consider the flat roof the roof *par excellence* for Canada, if the ventilating shaft be run up as proposed. In the first place it utilizes the rain-fall in flushing the sewer. In addition to that, it does away with the necessity of having to put spouts round our houses, and also does away with the danger and inconvenience of icicles and snow slides, and a good many more advantages are also gained by adopting the flat roof. I cannot see that it would make any difference if the draft did go down, as it would go down one house and up another, and if it does this, I do not see the force of the objection, 'The draft will sometimes be downward.' I consider some trap imperatively necessary, as without one the gas would be sure to force itself out into the house. The trap at the entrance of the shaft from the sewer proper, I quite agree with Dr. Godfrey, is very objectionable, as it counteracts the effect of the up-shaft. I find that the hot sewer air comes up quite the same in hot weather as it does in the coldest in my own house. I add my testimony that the system is very good without the trap at the front."

Dr. Godfrey then explained that when the flat roofs were not ventilated, the heat struck them, thawing the ice and tearing the felt. With regard to the danger from a fall of water untrapping the traps, I believe that a three-inch pipe will never fill. I have never known any effluvia in any of the houses built on this principle. As Mr. Robb has very wisely remarked, it mattered little whether the draft went up or down.

Dr. Rourk thought that the descending water would be likely to freeze. The velocity attained by the water in a high building would be sufficient to produce a powerful draft after it, which would be sufficient to remove the air from the syphon traps and open them.

Dr. Godfrey said if the assurance he made was true, his (Dr. Godfrey's) plan must be a failure, but let any man go to the top of one of the buildings ventilated in that manner and he will find that he can both feel and see the hot air rising and the traps are not necessary.

Mr. Boxer, Mr. Short, and others, having addressed the meeting, the Chairman, Mr. Mercer, then delivered a few closing remarks, and the meeting adjourned.

Correspondence.

To the Editor of Public Health Magazine :—

DEAR SIR,—To the practical engineer, a great many of the questions relating to the drainage of cities, and discussed with so much earnestness by what I may call amateurs, appear to fill a place in the minds of the community out of all proportion to their importance. There seems to be too much straining at gnats and swallowing camels,—too much of a desire to make the subject a chemical rather than a physical one. The system recently introduced by Capt. Liernur, although very ingenious, is never likely to be introduced to any extent in practice, on account of its complexity, and consequent liability to become deranged. Nor does it seem even desirable to one accustomed to travel in the underground streets of a city. Most persons would be astonished to find how little the water in the sewers is discolored; whatever solid matter finds its way into them appears to be quickly dissolved, for the water generally can be seen through distinctly, when not more than eighteen inches in depth, which by the way is more than can be said of our water supply at all times. The idea, then, of dividing this apparently harmless liquid into three or four parts with separate conduits, seems to be chimerical and altogether Utopian in character.

With regard to the ventilation of the sewers, it occurs to me that the question is much more simple that it at first sight appears. The plan recently advocated by Dr. Godfrey, and others, at a meeting of the Public Health Association, and also in the able report of the Boston Drainage Commissioners recently published, appears to be the only practicable plan *for our climate*,

if we are careful to put in the provision recommended in the report alluded to, viz. "That the upper ends of the rain water spouts be remote from windows or tops of chimneys communicating with rooms occupied by human beings." But a man can work eight hours a day in our sewers for an indefinite period without suffering any visible effects. Could he do this if the air was as poisonous as represented? I think not.

The real difficulty lies in another direction. Too much stress, in the first place, cannot be laid upon the importance of the service pipes being properly laid from the main sewer to the house. One half of the trouble is here. Among the numerous cases in which I have been called upon to examine drains, nine-tenths of the defects are owing to pipes badly laid, cracks in pipes, bad joints, or no traps.

In the second place, another, and, I believe a most serious source of trouble is in the plan carried out now for years in Montreal of laying the bottoms of sewers in dry brick without mortar. It was believed, no doubt, that by doing so the sewers would allow the water in the ground to find its way into them, as in the case of field drains; but I fear that one consequence of the system has been to charge the soil with fæcal matter, which cannot by any means be deodorized owing to its depth; but there is doubtless sufficient heat to generate gases, which it is fair to presume would travel along the line of least resistance towards the houses,—the hard crust of the road being almost impermeable—and impregnate the atmosphere with vile odors for which the trap, the sewer, or the plumber might readily be blamed.

The question of drainage is eminently a question of size, grade, location, and construction; without these four conditions being satisfied, no system of sewer ventilation, service pipes, traps, or gullies will be of any avail. The subsidiary questions ought to lie over till the primary ones are disposed of.

I am, Sir,

Yours truly,

JOSEPH SMITH, C.E.

ON D TRAPS FOR WATER-CLOSETS OF DWELLINGS.

To the Editor of the Public Health Magazine :—

SIR,—There is a communication signed "D. B." in your March number denouncing the use of the D trap for the water-closets of dwellings, as "one of the most fertile sources of bad smells, morning headaches, lassitude, and even fevers and death." As I have frequently advocated the use of this form of air trap, perhaps you will allow me space to reply. Firstly, that said trap is *not* in common or general use, but on the contrary is very seldom used; consequently, it is not a "pet trap," nor a "fertile source of bad smells," as "D. B." asserts. Secondly, it is quite clear that your correspondent does not understand either the construction or the working of the D trap, for he says it is "simply a depression or rather a bend in the pipe," whereas, this trap has neither bend nor depression; nor is it necessary to fill it with water to make it air-tight, and "syphoning" in connection with a D trap is so palpably absurd as to render contradiction unnecessary.

Finally, if the above communication is an exponent of the knowledge of D traps possessed by R. Barnes Austin, Esq., Sanitary Inspector, I think the sooner that gentleman overhauls his knowledge of such traps the better.

JAMES H. SPRINGLE, C.E.

Montreal, March 6th, 1876.

As our Magazine is generally out a few days before the month it is due, we would announce to the friends of the University that the Annual Convocation for conferring degrees in Law and Medicine will take place on Friday, 31st March, at 3 p.m., at the Wm. Molson Hall.

Also, there will be a public meeting of the Citizens' Public Health Association in the evening of the same day, at the rooms of the Natural History Society, at 8 p.m., when a paper will be read by Dr. Donald Baynes on "House and Sewer Ventilation." All persons interested in sanitary science, and the public generally, are cordially invited.

Reviews.

THE DEVIL'S CHAIN. By Edward Jenkins, M.P.

We have just received the above work from Chas. Hill, No. 666 Dorchester street. It is an exposure of the misery, want and crime that must ensue from the abuse of intoxicating liquors. The intention of the work is good, but the manner of conveying the moral is too bald and repulsive. There is not that polish about it that there should be to make it a very popular work. There is a want of the *naiveté* that made his "Baby" so popular, and which so cleverly demonstrated that the calamities and sufferings of man were capable of being described so as to give no offence to even the most fastidious. The author is capable of dressing his characters naturally, and yet not distastefully, and his talent should bend to this requirement of society if he seeks to succeed in the good work he has at heart.

LIBRARY OF MCGILL COLLEGE—CATALOGUE OF AUTHORS.

We have received a very complete Catalogue of Authors of the above Library. It is very evident that the Library of our Alma Mater is improving both in quality and size. Special thanks are given to Mr. Wm. Molson, Mr. Peter Redpath, Mr. Alexander, and the late Dr. Robson, of Warrington, England, and also to the McGill College Book Club, in the preface. We are pleased to see that special arrangements have been made to allow citizens who wish to gratify their literary tastes, admittance under the following rules, 10–11 :—"Persons not connected with the College may consult books in the Library on obtaining an order from any of the governors, or from the Principal, the Dean of Faculty, or any of the Professors; and donors of books or money to the amount of $50, may at any time consult books on application to the Librarian."

"The Library will be open from 10 a.m. to 4 p.m. daily, except Saturdays, during the Session, and in the months of May and June. On Saturdays it will be open from 1 to 4 p.m."

BOOKS AND PAMPHLETS RECEIVED.

CANADIAN MECHANICS' MAGAZINE.

The February number of this magazine has been received. It contains the usual amount of valuable information, and several beautiful photo-lithographs, more especially one of "The Girard Avenue Bridge, Philadelphia." Among the patents taken out in January, is Griffin's Improvement in the Manufacture of Peat. We would like to see this in full operation, as it would greatly aid the poor in cheap fuel if our large peat bogs could be utilized; besides, the combustion of it as fuel is not nearly so injurious to health as coal.

THE WEST VIRGINIA MEDICAL STUDENT.

We have just received this new addition to medical literature. It is edited by James E. Reeves, M.D. It is very promising in appearance; well printed on good paper, with thirty-two pages of well-selected reading matter in each number. We wish our contemporary a long and useful life. Price, $2.00 per annum.

THE LOUISVILLE MEDICAL NEWS.

This is a weekly periodical of Medicine and Surgery. The profession has long been wanting such a weekly publication. It is edited by R. O. Cowling, M.D., Prof. of Surgical Pathology and Operative Surgery in the University of Louisville, and William H. Galt, M.D.

THE CHRISTIAN WORKER.

This magazine is still doing a much-needed reform. We earnestly recommend it to all our family readers. It is admirably adapted for household reading.

THE DIETETIC REFORMER.

This is an oddity from London, on Vegetarianism. There is too much trash of this nature circulated in London and elsewhere, and we mention this to warn our readers against such balderdash.

MONTHLY ABSTRACT of the Medical Sciences for March is received.

The selections this month are very valuable to the profession.

PUBLIC HEALTH MAGAZINE.

MARCH, 1876.

SORE THROAT.

Having had lately many cases of sore throat coming under our notice, we think a few words as to a very common cause of sore throat may not be out of place, more especially as the cause is quite preventable. It is simply this, acquire the habit of breathing through the nose, the natural respirator, and the one that God has himself provided (and into which He breathed the breath of life), and therefore far before those manufactured deformities we see in our walks. It only requires a little perseverance at first; the habit once formed, the trouble is over, and we find that we breathe as naturally through the nose as we do now by the mouth. The functions of the mouth are eating, drinking and talking, except when we speak through the nose, a peculiar habit of a peculiar people. The functions of the nostrils are smelling and breathing. Now, why should we upset the order of nature and make the mouth do the work of the nose, and *vice versa?* Man, and especially white or civilized man, is the only animal that breathes through the mouth, a habit formed in infancy, owing to the carelessness or ignorance of parents.

The Indian mother is always careful to close the lips of her child when asleep. This habit, formed in childhood, is continued throughout life, and immunity from chest and throat affections is the reward. Neglect or ignorance of this fact has, as its result, the frequent sore throat, bronchitis, and even consumption. The importance of keeping one's mouth closed is especially to be insisted on when leaving hot rooms, theatres, &c., and going into the cold air. The air being drawn into the lungs, through the

mouth, passes quickly, and, being of a lower temperature, it causes a sudden chill, frequently followed by irritation and inflammation of the lungs, various forms of sore throat, or, passing along the Eustachian tubes, causes deafness.

On the other hand, if we breathe through the nostrils, the cold air passing through their various passages and many recesses lined by a highly vascular fibro-mucous membrane, becomes gradually warmed, the many impurities, such as dust, &c., are caught by the minute vibrating filaments lining the membrane, and the danger of breathing cold air, fogs, &c., is reduced most materially. Those who sleep with their mouths open, wake with their mouth dry and parched. We would say to them try sleeping with your mouth shut, and the comfort thus gained will amply repay the slight trouble of conquering a bad habit. Perhaps the best plan is to begin by passing a bandage under the jaw to support it. This will not be required for more than a week or ten days. We may say, in conclusion, that the fashion of wearing fur boas and wrapping up the throat has one very certain result, viz., sore throats, with their many complications.

SANITARY STATISTICS.

We have cause again to congratulate the friends of sanitary progress on the motion of Dr. Brouse (to whom the thanks of all sanitary reformers are due) for the appointment of a select committee to enquire into the expediency of asking legislation with a view to constitute a bureau of sanitary statistics in connection with one of the public departments. The result of the establishmen. of such a bureau would be to furnish authentic tabulated statements of the health of the Dominion, which would be circulated everywhere, and would be a thorough stimulant to sanitary science, educating people in the laws for preserving life. It is an interesting fact that in the State of Massachusetts there has been a reduction of death rate of 15 per cent., attributable to these wise legislative enactments. Nor is Massachusetts alone; in Michigan, as far back as ten years ago, the same course of legislation has led to the gratifying result of 16 per cent. diminution in the death rate

in those years. Other States are following the example. When we consider the population of these States of the Union it, of course, appears the proper measure that each State should legislate and attend to its own special condition, but, with regard to the Dominion, it does not appear to us to be so absolutely required to confine our acts in this matter to the Local Legislature, as insisted on by the Hon. Mr. McKenzie. Of course, each Province would do its duty in this particular, but we do think that a general statement from the central government would give a great stimulant as shewing the spots in our whole country that are going behind, and where measures should be taken to raise the sanitary tone. But be it local or general, the movement, under the sanction and superintendence of legislation, will secure what is so great a desideratum in the progress of this science, compulsory, authoritative and reliable statistics of the sanitary condition of the country. Dr. Brouse has computed the annual loss to Canada through deaths from *preventible causes* at $27,000,900. Surely this statement is enough to make us bestir ourselves and look into these matters. Much money is annually spent in promoting and forwarding immigration to this country, as the Legislature are alive to the absolute necessity of developing the country, which can only be done by increasing the population. Yet, owing to deficient sanitary measures, and want of reliable statistical reports, the advantages gained by immigration are, to a great extent, counterbalanced by not taking care of the population we already have. Legislation, on this subject, would be a stimulus to the medical officers of health to show a low death rate for their district, especially if that death rate was examined at a government bureau and compared with that of other places. If an undue mortality in any place called for an explanation from the medical officer of health as to the cause of this high mortality, and he be required to look into the matter and have the cause remedied, of course the medical officer should have power to summon those who, for their own convenience or gain, are breaking the laws made by the Legislature for the preservation of health.

Miscellaneous Selections.

USES AND ABUSES OF LIFE INSURANCE.

BY A. H. DANA, ESQ.

No subject is more intimately connected with domestic and business calculations than life insurance properly understood and applied. Yet it has been enveloped by mystery, with its usual sequence of credulity on the part of the insured, and the counterpart of mercenary advantage inuring to the insurer. In this respect it is much like the old medical practice when it was mostly empirical—in which was exhibited an unreasoning submission by the afflicted to the crude prescriptions of professional charlatans—or like the still more marvellous faith of the ignorant in the pretended miracles of religious fanatics in former ages.

The comparison is of course intended only to show a phase of humanity which has been world-wide in its exhibition, viz.: that whatever is not understood is received with unquestioning credence, and that in every age there have been found those who were ready to turn to their own account this popular imbecility. As, however, there has been in later years a development of true science, which is getting to be more or less comprehended by all who have an average practical education, and so the gross impostures of past ages have been gradually superseded, in like manner whatever subject is rationally cleared up will be in that proportion divested of susceptibility to being perverted to merely selfish purposes.

Life insurance is as yet but little understood by those who should be benefited by it, and therefore has been made to serve for disproportionate benefit to those who are keen to avail themselves of the opportunity of profit from the weakness of others. I propose to elucidate some elementary principles which should be the basis of insurance rightly conducted, but without going into any extended mathematical details. That is the proper office of actuaries, and undoubtedly there is accuracy enough in working out results from the premises assumed. It is with the initiative, or groundwork, that I have to do, and my object is to expose certain fallacies which appear to me to be interfused

through the whole system, and operating injuriously against the larger number of the insured, and precluding many others from availing themselves of the protection they might have if insurance was made less onerous.

I. As to the Contract of Insurance.—It is an undertaking by the insurer to pay a certain sum on the death of the insured, or at some other fixed period, in consideration of receiving an annual premium, or what shall be equivalent thereto, sufficient according to the tabular estimate to make good the sum to be paid when it shall become due. It is evident, therefore, that the insured is to furnish the means of making such payment, or perhaps it would be more accurate to say that the aggregate of premiums received from policy holders is to supply the fund for payment of all the policies as they shall become payable.

Virtually, as far as the insured is concerned, it is the same thing as if he should set apart the sum which he pays annually for premium, and deposit it in a savings bank, or other institution where a moderate interest would accrue. The amount of interest which insurance companies generally assume as a proper allowance for the profit they can make upon the moneys received by them, is about four per cent., which rate there would be no difficulty in realizing by the insured in the manner above proposed. Several considerations, however, intervene affecting such self-insurance: In the first place, to set apart a certain sum annually for such purpose, and leave it to accumulate, requires a firmness of purpose which is unfortunately the exception rather than the rule. The larger number of those who should be insured have not a surplus which they can thus set aside—or at some time or other there will come a hard pressure—the money is wanted for *present* use—and there will be an almost irresistible propensity to appropriate the whole accumulation for immediate exigency, leaving the future unprovided for. It must be conceded that the *duty* of making provision in some mode will have to be more thoroughly impressed upon the community, before the method of self-insurance can be made operative to any large extent. Perhaps nothing would insure the safety of such annual deposit but placing it absolutely out of the reach of the insured, as much so as if it had been paid to an insurance company for premium. Legislation for that purpose might be useful. It would very much tend to promote the practice of insurance deposits if trusts should be created by law having special reference thereto —that is to say, if it should be made the business of corporations chartered for that purpose to attend exclusively to the care of such deposits, under a proper guarantee for the security thereof,

to be provided by the legislature. The objection of straitened means, as interfering with the annual deposit, or as inducing its withdrawal, applies as well to the continuance of policies of insurance under similar circumstances. Formerly a large proportion of policies lapsed from inability of the insured to pay the premium, and all that had been previously paid was lost. This constituted a considerable part of the profit of insurance companies. I shall consider hereafter what indemnity is furnished by the recent regulation of some of the companies, making a small allowance to the policy holder in such cases.

Another objection to accumulation in savings banks, in lieu of a policy of insurance, is the insecurity incident to the management of such institutions, of which we have lately had some startling instances.

A final consideration is the uncertainty of an individual life. We have here brought into view the essential reason upon which life insurance is based, viz: that while an individual life cannot be calculated with certainty, yet it can be determined with great exactness what will be the average of deaths in a certain number, whether per 100 or 1,000. An insurer could not with safety take the risk of a single life only, but in taking a considerable number of lives the average mortality comes in—and we are next to consider more in detail the application of that rule in the business of insurance.

II. METHOD OF CALCULATING THE RISK OF INSURANCE.—Statistics show that a certain number of 1,000 persons die annually. The Northampton Tables (published in 1783) were made up by Dr. Price, for the use of the Equitable Insurance Company, of London, upon which the rates of premium were to be calculated. Those tables were based upon the burial register at Northampton for forty-six years (1735–1780). It was afterwards proved by Dr. Farr that these tables were unreliable, and that a great advantage had been gained by the insurance companies who had graded their premiums thereby. The defect was that it was assumed that population was stationary, and that births and deaths were equal. Dr. F. made up new tables from population returns, and the numbers living and dying in the same parish that had been tabulated by Dr. Price—(the statistics being for 1841). He also made up new tables founded upon the results of seven years' combined experience of different companies (1838–1844). Other tables were made by *Joshua Milne*, from observations at Carlisle (1779–1787), which were called the Carlisle Tables, and which came into general use. These were published in 1815. What is called the "*Experience Table*" was compiled from data furnished by seventeen offices, under an

arrangement made by them in 1838. Other compilations have been made, but the most authentic sources of information from which tables may hereafter be constructed are the records of births, deaths and marriages which have been made in England since 1839, and the census returns in this country, which are becoming more and more perfect.

Mr. Wright* states the rule of calculating the risk of insuring $1,000 for a year to be according to the average of deaths of 1,000 persons at that age—which at 25 is 10, at 75 is 100, and that the cost of insuring is as many dollars as there will be deaths. I don't perceive the basis of this precise measure, though it appears to be in accordance with the general practice; but it is immaterial to the present question. There should be at all events a graduation of premiums according to the death rate, and the main question is whether in insurance business that has been strictly regarded,

Striking illustrations meet us in the investigation, showing a most singular discrepancy at different periods, and in different modes of calculating still recognized. The original Northampton Tables, which for near fifty years was the general basis of calculation of insurance premiums, and which, in the old companies subsisting at the time the tables were published are still relied upon, show an immense gain by the insurers which they were not entitled to, as will appear by the following tabulation.

The following table shows the annual number of deaths in 10,000 persons living, at each age, according to the Northampton and other tables. The second table shows the expectation of life according to the Northampton Tables as compared with Dr. Farr's.

Another element of advantage to the insurance companies in this country is that they follow, with little variation, the rates in the English tables, but it is demonstrable that whether those tables accurately represent the real death rate in England or not, they are largely in excess of the mortality appearing by the two last United States Censuses. By the Census of 1860, the death rate was 1 in 79; by the Census of 1870, it was 1 in 78 and a fraction; the percentage being by the former 1-27, by the latter 1-28; while in England the death rate is understood to be about 1 in 44, and the percentage, according to the annual mortality, 1847–1857, was 2-276.†

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*Politics and Mysteries of Insurance.

†Encyclopedia Britannica—Article, Mortality. According to Nelson's Vital Statistics (see Statistical Journal, v. 8, 1845) the percentage appearing by the Reports of the Registrar-General (1839–1841) was males, 2,290; females, 2,119.

No. 1. MORTALITY IN 10,000.

Age.	Northampt'n Table.	Carlisle Table.	Experience of Offices--adjusted Mortality.
20-24	747	351	374
25-29	814	410	350
30-34	886	506	438
35-39	972	547	485
40-44	1,113	705	548
45-49	1,266	718	679
50-54	1,521	760	902
55-59	1,800	1,103	1,241
60-64	2,173	1,847	1,767
65-69	2,734	2,235	2,589

No. 2. EXPECTATION OF LIFE AT DIFFERENT AGES, ACCORDING TO TABLES OF DR. FARR, COMPARED WITH DR. PRICE'S.

Age.	Probable Life.		Annual Premium to Insure £100 at Death.		Single Premium to Insure £100 at Death.	
	Farr.	N'ampton.	Farr.	N'ampton.	Farr.	N'ampton.
10	47·57	39·54	£1·185	£1·714	£28·946	£37·044
20	39·93	33·40	1·549	2·163	34·717	42·616
30	32·59	28·15	2·067	2·655	41·506	47·686
40	25·49	22·85	2·869	3·393	49·625	53·809
50	18·76	17·49	4·202	4·620	59·054	61·334
60	12·27	11·91	6·935	7·139	70·424	71·021

The exceptional advantage of insurance in this country is further shown by the following statement, made up from the latest returns of the aggregate of British and American insurance :

	Amount Insured.	Funds.	Death Claims Paid within One Year.
British.....	..$1,640,192,519.....	$512,666,011.....	$38,586,658
American ..	2,086,027,178.....	360,140,684.....	27,232,435‡

In this connection should also be noticed the observations made in Sweden, which were much relied upon by Dr. Price, as also by Mr. Milne, and are generally quoted by English statisticians. According to observations during twenty-one years, ending with 1775 (which were furnished to Price), the annual death rate was males, 1 in 33·25 ; females, 1 in 35·94. From later observations in the same country, for twenty years ending with 1795 (which are incorporated by Milne in his treatise published in 1815), the death rate was males, 1 in 35·60 ; females, 1 in 39·11.—*The Sanitarian.* (*To be continued.*)

‡ This table is taken from Appleton's Cyclopœdia, second edition—Article, Life Insurance. How late the statistics are of the American companies is not stated, but I think it will be found that the proportion of insurance to death claims paid, is still larger at the present, and that the capital or reserved fund is also in increased proportion to the death claims paid.

DEATHS FROM CHLOROFORM.

The readers of medical periodicals must often be startled by the number of ominous paragraphs headed "Another death from chloroform," and their confidence in this valuable anæsthetic has been much shaken by the attempts that are being made to give undue prominence to the dangers sometimes following its use. General readers, moreover, are seldom ignorant that both in medical and in non-medical hands death is occasionally the penalty of using chloroform, and of late a succession of catastrophes of this kind among persons who, from happening to belong to the higher classes, have all their movements duly recorded in the papers, must have increased the popular dread of so potent a drug. Thus is it always; no sooner is some discovery made for the good of mankind than enemies arise, who display the perversest ingenuity in raising all the objections they can think of to its legitimate employment, while persons unacquainted with its uses and dangers rashly attempt to turn it to account, and of course do themselves harm instead of good.

Chloroform, ether, opium, and chloral-hydrate, are among the greatest blessings which the progress of chemical science has placed within the reach of man, and, rightly used, save every year thousands of lives, diminish suffering, and make the approach of death more endurable, provided always that the administrator of these drugs thoroughly understands their uses and knows how to reduce their dangers to a minimum. Some deaths will always follow the administration of chloroform; although for every life thus sacrificed, at least a hundred will be prolonged or saved.

What chloroform has done it would be difficult to describe to non-medical readers. Hundreds of thousands of operations have been easily and painlessly performed under its soothing influence. The dread of submitting to a surgical operation has been reduced to a minimum, while the recollection of the agony endured while the operation was going on no longer distresses the patient all the remainder of his life. Many operations can now be attempted that, but for chloroform, would be impossible or unjustifiable. The surgeon can deliberately and skilfully go through all the steps of an operation, as a few minutes more or less are, generally speaking, of secondary importance. To the oculist, chloroform has been invaluable, and has given increased facilities for performing some of the most difficult and delicate of surgical operations. Dislocations are often readily reduced under chloroform, when all the violence in the world might otherwise be insufficient. Hernia can often be successfully treated when, without chloroform, any

interference, except with the knife, would be out of the question, or extremely dangerous. Add to this the number of lives formerly sacrificed in consequence of the agony of an operation either killing the sufferer outright or terminating his existence a few days or hours later; add, moreover, the indescribable relief the administration of chloroform after an operation often brings the exhausted sufferer; add, also, the gain chloroform has been to army surgeons in extracting and finding bullets deeply embedded in the tissues of the victims of war, and the relief to surgeons who have operations to perform, to be spared the distracting cries and agonising writhings of the hapless sufferer, and our statement that the use of anæsthetics is an unspeakable boon to operator and patient, must pass unchallenged.

But it may be objected that the mortality after operations actually appears to be greater now than formerly, while many persons have an uncomfortable notion that many deaths occur from chloroform; how, then, can it be pleaded that life is saved? When, however, it is remembered that very many more operations are performed than formerly, that every year in London alone hundreds of sufferers, who would have been left to die unaided, are now given the chance of an operation, our statement is seen to be literally true. The cases which, before the discovery of chloroform, were submitted to operation were picked; but now such prudence is no longer necessary. As for the deaths from chloroform when properly administered being proportionately numerous, that is absurd; perhaps one death in four thousand administrations would be an excessive estimate. But, after all, the diminution of suffering is the great thing; and were chloroform far more dangerous than it is, its use could not be dispensed with.

Once more we repeat that our remarks only apply to chloroform, and indeed to all anæsthetics, when *administered by competent hands*. No drug is more dangerous than chloroform when used by the sufferer himself, or when in the hands of ignorant persons. General rules are of little service, while as for the appliances and graduated measures sold they are a delusion and a snare. The value and the danger of chloroform can only be learnt in the sick room, or in the operating theatre. The young medical man, by seeing this drug administered by more experienced seniors, is trained to give it; thus, and thus only, he learns when to give more and when to cease giving, and a hundred signs, useless to an inexperienced spectator, tell him that the patient, though on the very brink of the grave, remains safe. Moments occur when the slightest carelessness for a single second means death to the patient; one glance aside, one instant of forgetful-

ness, and the mischief is done. And ought such a drug as this to suffer discredit because the ignorant and the careless do not know how to avoid its manifold dangers? Ought such a drug to be taken by sleepy women, or stupid men? No surgeon, who was not grossly incompetent, would dare to place a handkerchief sprinkled with chloroform on a patient's mouth while he walked once or twice up and down the room, and yet cases are not infrequent of persons applying a handkerchief to their own mouths and nostrils, and quietly going off to sleep. The extreme peril of such a course can hardly be exaggerated. Why, as the muscles come under the influence of this powerful drug, they are completely relaxed, and the tongue falls back in the mouth, closing the opening to the larynx, and making death by suffocation not improbable. The wonder is that many more deaths do not occur under such circumstances.

We should not omit to say that probably many of the deaths attributed to the careless use of chloroform have really been instances of suicide. We are not reflecting on any case in particular, nor do we wish to call in question the verdicts of coroners' juries. But is anything more likely than that a nervous woman, depressed with fancied pains, and the prey of worry, should, in some fit of despondency, intentionally saturate a handkerchief with chloroform, and thus quietly and painlessly pass away. Several cases, the particulars of which we have read, certainly suggest the possibility of such an explanation being the correct one. In that case some of the distrust of chloroform now felt, both in professional and non-professional circles, might be quite unfounded.

When chloroform is administered it should be by a competent and cautious medical practitioner, who has time to attend to his responsible duty, and when it becomes necessary to resort to less experienced hands, it should be some member of the sufferer's family, or a sensible and clear-headed friend, who should be called upon for the purpose, though even then the administrator should be duly warned how to proceed. No patient should ever practise on himself with such a drug as chloroform, and then there would be a speedy diminution of the deaths from what is and long has been a priceless blessing.—*Sanitary Review.*