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THE

SANITARY JOURNAL.

DEVOTED TO

PUBLIC HEALTH.

VOL. III.] JANUARY, 1879. [No. 11

INFANTILE OR SUMMER DIARRHŒA; ITS NATURE AND CAUSES.

The reports of the Registrar-General of Great Britain show that diarrhœa is on the increase in that country. The death returns to the Registrar-General of Ontario also show that this disease is increasing in frequency; especially is this shown if we analyze the total infantile death-rate—from convulsions, enteritis, and cholera infantum. Diarrhœa, and kindred diseases of the alimentary canal, indeed, cause a very large proportion of the deaths in Ontario, especially of young children, and the study of their nature and causes becomes one of the highest importance.

The theory has been advanced that infantile diarrhœa is a sort of typhoid fever, if not actually typhoid. Professor Virchow states, in effect, that the death-rate rises in Berlin in July, August, and September, and this is due to excessive infantile mortality, mainly from diarrhœa, and the rise of this disease he found to be coincident with the fall in the ground water of the Spree. 'It cannot be doubted,' he says, 'that the fall in water levels (*i. e.* subsoil water) is conditioned by the increased evaporation produced by the increasing temperature.' Exactly the same conditions—fall in the ground water—was found to precede an increase in the severe epidemic of typhoid fever which visited Paris two years ago.

In a paper on 'infantile diarrhœa' by W. E. Buck, M. A., M. D., (Cantab), health officer for Leicester and Rutland, in the *Sanitary Record*, the writer in conclusion says, 'I believe there are three factors at least, concerned in the causation of this disease, viz., heat, dampness of soil, and organic impurity.' Dr. Buck says: 'The American physicians are almost unanimous as to dampness of subsoil causing infantile diarrhœa, and they act accordingly. Dr. Lewis Smith, in his book on diseases of infancy and childhood (a really good book, which is not so well known in this country as it deserves to be), says, 'It is thus seen that the prevalence of intestinal inflammation of infancy in the city bears a close relation to the degree of summer heat. That the high temperature of summer is not in itself

sufficient to produce entero-colitis is, however, obvious. In elevated localities in the country there may be intense and long-continued heat, and yet in such places intestinal inflammation of infants is not common. It is no doubt the noxious exhalations from various sources with which the atmosphere is loaded, as a consequence of the heat, which render the disease so prevalent in certain localities in the summer months. The exact character of these exhalations or vapors is not fully known, but the following fact is clearly established by many observations. Entero-colitis prevails mostly on low grounds.' Experience and observation concur in stating that, when children suffering from diarrhœa are removed from malarious miasmatic districts to elevated spots, they rapidly recover. One physician goes so far as to suggest that a sanatorium should be built on an elevated site outside the town of Boston, and that all children under one year of age should be sent there from June till the end of September.'

It appears it is not the dampness of soil, *per se*, which causes the disease, but the evaporation of moisture containing low forms of life, and their dissemination in the air ; which condition is of course accompanied by a fall in the subsoil water. The heat favors rapid evaporation and evolution of these low forms of animal or vegetable life—different forms of bacteria.

Dr. Parkes observes that dampness of soil affects health 'by aiding the evolution of organic emanations.' The decomposition which goes on in a soil is due to four factors, viz., presence of decomposable organic matters (animal or vegetable), heat, air, and moisture ; these emanations are at present only known by their effect, they may be mere chemical agencies, but more probably they are low forms of life which grow and propagate in these conditions ; at all events, moisture appears to be an essential (though not the only essential) element in their production.

The death-rate in Toronto in 1876 was exceedingly high, especially among young children, and from diseases of the alimentary canal, such as diarrhœa and cholera infantum. A good deal of rain had fallen during the first half of the previous month, July, and some during the second half of this month, but none fell in August. It was an unusually dry month, and the temperature was high—conditions most favorable to the rapid evolution of organic emanations. In such conditions the level of the subsoil water would be reduced to the lowest point, exposing a series of decomposing foci ; and the large amount of evaporation caused by the heat would be highly favorable to the diffusion of these organic emanations. The highest point in the mortality was reached in the second week in August, at a time when the evaporation would be greatest.

In the London *Lancet* for December is a very excellent paper on this subject by William Johnston, M. D., health officer, Leicester Borough, from which we give the following extracts:—

Much speculation at present exists with regard to the causes of this annually recurring and universally distributed epidemic. Many

theories have been advanced, some of which have been ably advocated by officers of health throughout the country. In my report to the Sanitary Committee on the mortality in the borough from the zymotic diseases during 1877, I gave it as my opinion that 'summer' diarrhœa depends upon the pollution of the air by the escape of sewer gas from badly-constructed and ill-ventilated sewers. My observations during the last eighteen months upon sewer air, and the microscopic organisms suspended in it, have convinced me that sewer air is the chief cause in the production of the disease, as no other condition, in my opinion, satisfactorily accounts for our high urban diarrhœa death-rates. I may be pardoned if I now venture to discuss the various theories at present advanced with the view to explain the cause of the disease.

1. *Artificial feeding.*—This pernicious custom, it will be admitted by all, is unfortunately but too prevalent amongst the mothers of the present day. The very exigencies of life seem to favor its increase amongst the poorer classes of the population; but although I am fully alive to the degeneracy of constitution that results from artificial feeding, and to the mortality that annually arises from the diseases induced by it, still I cannot accept it as the active cause of the *sudden* mortality amongst our infantile population during the summer months. . . . . Artificial feeding, however, *in districts where insanitary conditions exist*, exerts a most powerful influence in the spread of the disease by acting as a vehicle for certain atmospheric germs, the introduction of which into the system, as I shall endeavor to show further on, gives rise to the disease.

2. *Maternal neglect, want of cleanliness, and ventilation.*—That the disease may be acquired under conditions where social sanitary measures are strictly carried out in the management of children was evidenced by what occurred in a crèche that has recently been established in this town. The average number of children, for the most part infants, in this crèche during the month of July was about twenty; and although every care was bestowed by trained nurses upon these infants with regard to the preparation of their food, cleanliness, &c., they nearly all acquired the disease.

3. *Ripe fruit.*—The consumption of fruit is much about the same in all manufacturing towns, and therefore fails to afford a solution of the wide variations in the prevalence of the complaint observed in different places. I shall, however, endeavor to prove that the eating of over-ripe fruit assists in the spread of the disease in the same way as artificial feeding—*i. e.*, the fruit forms a succulent and effective vehicle for germs when present. I have induced the disease in my own person on two occasions by the partaking of over-ripe plums. The minute organisms present in these plums, and which unquestionably gave rise to the disease, I shall describe later on.

Meteorological conditions.—Before entering upon this subject, I may state that I consider atmospheric conditions act only as *excitants* of the disease, and this only applies to localities where other conditions are met with that act powerfully as *predisposing* causes, for I feel as-

sured that if we could discover any particular town or district whose sanitary machinery was in perfect working order the vicissitudes of climate would there be found to be perfectly harmless in the production of the disease.

I have arrived at the following conclusions with respect to the weather conditions that seem to influence diarrhœa mortality, after a careful tabulation of the meteorological conditions and diarrhœa mortality experienced during the summer months of each year since 1866. The prevalence of the disease appears to be governed by three weather conditions—viz., temperature, atmospheric humidity, and rainfall, and these follow in the order of their importance. The combination of these that seems most potent for evil is high degrees of heat, great atmospheric dryness, with little or no rainfall. This combination was experienced throughout July of 1868, and the diarrhœa mortality was greater than has ever since been recorded.

In reference to *subsoil temperature*, when temperatures of 56° F. and over are once established in sewers, putrid fermentation sets in, and the process goes on with a rapidity that is directly proportionate to the increase of temperature attained in the sewer. Sewers in this heated state afford the very conditions (heat, air, and moisture) for the rapid putrefaction of all the putrescible liquids and animal excreta that may be retained in them, for the air of a sewer, if not sufficiently ventilated, is always at the point of *complete saturation*.

ON THE ORIGIN OF THE DISEASE.—My observations, during the last eighteen months, upon the microscopic organisms contained in ordinary air and that of sewers, are much too numerous to mention in this already too lengthy paper; I will therefore, only draw attention briefly to what I have observed, and the conclusions I have drawn therefrom.

(1) During the summer months, the liquid portion of sewage derived from sewers of deposit will be found, upon microscopic examination, to contain great numbers of living forms, including (*a*) several genera of bacteria, such as micrococcus, bacterium termo (free and in the zoogloea form), bacillus, and vibrio; (*b*) rapidly-moving infusoria, flagellate and ciliated, belonging to several kinds of common protozoa, as monadina, euglenia, alyscum, trichodina, paramecium, kerona, &c.; and (*c*) microscopic hirudinea. The above living forms are always accompanied with variable quantities of the spores, spore-cases, and mycelium of fungi.

(2) The *moist air* in ill-ventilated and non-cleansing sewers, when the temperature of the latter is above 57° F., contains bacteria of the genera micrococcus and bacterium termo, the numbers present being in direct ratio to the increase of temperature from 57° to 69.5° (the highest temperature observed).

(3) The same organisms are to be found in the confined air of cesspools, and here their numbers increase with the atmospheric temperature.

(4) The trapping water of all gully-grates and stench-traps, when connected with sewers of deposit, contains great numbers of both kinds of bacteria, derived in great measure from the air within.

(5) During hot weather, and especially when conjoined with great atmospheric dryness, these organisms are given off from all liquids containing them, and are carried into the air in very large numbers by the ascensional force of evaporation. This fact can be easily demonstrated by covering any vessel containing a solution abounding in bacteria with a glass plate. The under surface of the plate becomes coated with watery vapor, which can be collected into drops by the addition of ether, and on subsequent examination discloses the presence of bacteria. These bacteria, as has been before stated, are the active agents in causing putrefaction in putrescible liquids and substances of animal organic origin, and their appearance in the air of sewers and close cesspools is a sure indication that rapid putrefactive changes are going on in the excrementitious matters that may be retained in the former or collected in the latter.

(6) In badly-sewered districts, milk will be found to be speedily infected with the above ferments; their presence may also be frequently recognised in the stale food of infants, if due care be employed in their collection.

(7) The juices that exude from and adhere to the over-ripe fruit, exposed in shops or hawked about in such districts, will be found, with few exceptions, to contain numbers of bacteria, (rods and spherules) moving about amongst the cells of saccharomyces exiguns (Rees), the ordinary variety of fruit ferment.

(8) The atmosphere of these districts during hot summer weather, when filtered, is always found to yield fungal elements, ranging in character from micrococcus to mycelial filaments. I have never detected the presence of bacteria in the air of the same localities during any day in April or May.

(9) For the last two years the commencement of 'summer' diarrhœa in Leicester has been contemporaneous with the appearance, in large numbers, of bacteria in the air of some of its sewers.

The weather conditions of 1878 have been more favorable than last year for the development, multiplication, escape, and subsequent atmospheric diffusion of these sewer organisms, and these conditions have given rise to a greater prevalence of the disease and a higher fatality.

In a previous part of my paper it was shown that the above organisms are present in great numbers in the bowel discharges and vomited matters of patients affected with the complaint under consideration. I therefore consider that (*a*) diarrhœa, as it affects both adults and infants during the summer months, owes its origin, in the great majority of instances, to the introduction of minute living organisms (bacteria) into the system by means of air or food; and (*b*) the disease depends upon putrefactive changes in the bowel contents, which changes are correlative to the development and multiplication of these microscopical organisms.

The strongest evidence in favor of the putrefactive nature of the disease is afforded by the treatment. I have obtained the best results by giving *antiseptics*, either alone or combined with mild astrin-

gents. The antiseptic preparations which seem to exert most power in arresting the sickness and diminishing the number of alvine discharges are—carbolic acid, quinine, salicylic acid, the mineral acids (especially the dilute sulphuric), thymol, benzoic acid, and borax. All these will be found beneficial in the treatment of the disease, and their power as remedies is here entirely due, in my opinion, to their antiseptic properties.

During July and up to the 9th August I was engaged in rather lengthened microscopic examinations of the bowel discharges from infants and adults, and during this time I acquired the disease no less than five different times. Each attack readily yielded to strong doses of quinine and dilute sulphuric acid; but after a lapse of some days, and upon resuming my examinations, a fresh attack nearly always followed in from twenty-four to forty-eight hours. These personal experiences, especially when taken in conjunction with the facts mentioned above under pars. 2 and 3, have convinced me that 'summer' diarrhœa is *contagious*, and that the chief vehicles of the poison in the above instances were the ejecta from the bowels of previously infected persons.

ON SYSTEMATIC EXERCISES; THEIR VALUE IN THE PREVENTION OF DISEASE.

BY EDWARD T. TIBBITS, M.D., LOND., PHYSICIAN TO THE BRADFORD INFIRMARY AND THE BRADFORD FEVER HOSPITAL; READ BEFORE THE MEDICO-CHIRURGICAL SOCIETY.

In introducing this subject I do not for a moment imagine I shall disclose any great novelty, but it is quite possible the importance with which I have regarded it may be considered by some persons exaggerated, unproven, or altogether fanciful.

It will be universally admitted that *properly regulated* exercise is absolutely essential for the preservation of that valuable combination, "a sound mind in a sound body." Should the exercise become deficient (which is by far the most frequent error), excessive, or irregular, unsoundness of mind or body to a greater or less extent is a natural, common, although, perhaps, not invariable consequence.

Now, it must be borne in mind that our function as medical men is mainly of a two-fold nature—viz., (1) to prevent disease, and (2) to cure it; and although I believe systematic exercises are extremely useful in the treatment of disease, it is only possible during the time at my disposal on this occasion to place before you an imperfect sketch of what appears to me their real *hygienic* value. Their sanitary influence may be considered to spring from two sources, the direct and the indirect, to the latter of which I propose mainly to confine my remarks.

And, firstly, a few words concerning the direct physical, or chemico-physical source. The direct beneficial effects of exercise are acknowledged by all men—lay as well as professional; nevertheless it is a fact, especially as regards its *systematic* character, which is practically ignored by a very large number of individuals. Without en-

tering very minutely into details, I will simply enumerate some of the more important effects of exercise. (1) It increases the action of the skin, lungs, bowels, and kidneys—i.e., those organs specially intended for the separation and removal of effete material. (2) It increases the quantity of heat within the body, although it probably does not produce much, if any, elevation of temperature. (3) It produces inspissation of the fluids of the body, and hence absorption of food takes place more rapidly and with greater facility. (4) The determination of blood to the muscles during exercise, to a certain extent, drains the viscera, and, as a consequence, they perform their respective functions more efficiently when called upon to do so.

In a few words, the probable, although perhaps not immediate, effect of the judicious systematic exercise of which I am now speaking is the production of a more thorough and rapid tissue change, in conjunction with an increased and more efficient functional activity of all parts of the body. Here, I think, it will not be out of place to refer briefly to the principal conclusions at which Dr. Pavy arrived in his interesting investigations on Weston, the pedestrian. He says —(1) That, although there is a greater elimination of nitrogen during severe exercise than can be accounted for by increased nitrogenous food, the motor power does not arise from oxidation of muscular tissue; and the greater proportion of nitrogen eliminated is probably directly derived from metamorphosis of nitrogenised ingesta, without passing through muscular tissue at all. (2) That, supposing the elimination of one grain of nitrogen to represent about 2.5 foot-tons, it was calculated that the nitrogen eliminated was only sufficient to account for about half the force expended. It is natural, therefore, to conclude that a considerable quantity of force must be developed from consumption of hydro-carbonaceous food. I may mention that Weston's work during his six days' walk represented nearly 1,200 foot-tons per diem. According to the late Dr. Parkes, 500 foot-tons is an extremely hard day's work. 'Every man,' says the same writer, 'ought to take an amount of daily exercise of some description equivalent to about 150 foot-tons, or a nine miles' walk.' It must not be forgotten that, although there are comparatively few individuals who make a point of actually walking nine miles daily, there are many who do an amount of work, in some form or other, equivalent to that walk. (3) That increased exertion requires an increased quantity of nitrogenous food. (4) That, with the exception of chlorine, sodium, and magnesium, there is a great increase in all the mineral ingredients in the urine, the most notable being phosphoric acid, which is nearly doubled during severe muscular exercise.

But, secondly, I believe that important salutary changes may be effected in the human body from what may provisionally be termed the indirect or physico-mental source. Without venturing to make too sweeping an assertion, I think it will be found, on strict and impartial investigation, that the following proposition is substantially correct:

1. That much disease arises, directly or indirectly, from excessive

indulgence in the gratification of the senses and appetites, or some form of selfishness.

Disease arising from an action, or a line of action, which is pursued altogether irrespective of others, because it is a source of pleasure to the individual performing it, is, I believe, much commoner than appears at first sight, or than we should be inclined to admit. I will not attempt to enumerate the different diseases which are constantly springing out of some form of excess, many of which do not admit of any doubt. From the crown of the head to the sole of the foot, commencing with the various forms of cerebral disease, and terminating with what I presume may be called that agonizing complaint of the great toe, I think it will be found that deficient self-control stands in a very prominent etiological position. But it may be urged that excess in all its forms has not so very much morbid influence, otherwise the amount of disease would be more commensurate with the great prevalence of bad habits. There must be a peculiarity of constitution, or a something else, to produce the effect. Most likely; but at the same time, if we have positive evidence of the sequence in ten or fifteen per cent. only, it is not irrational to infer that the ratio in all probability is considerably greater, although incapable of positive demonstration. If it were possible to strike six persons on the leg in the same spot with the same weapon, and with exactly the same amount of force, it would not be surprising if results differed somewhat in each case. Perhaps in one or two instances only the leg might be fractured. Would it, therefore, be logical to say that, after all, the blow had not very much to do with it? But, independently of the direct origin and propagation of disease in this manner, are there not many undoubted morbid tendencies produced by drunken parents neglecting to make proper provision for their children? May not the spread of many of the exanthemata be traced to the selfishness of parents, schoolmasters, and owners of property? Can we not detect in marriages of consanguinity and the union of delicate individuals a certain amount of selfishness, although it may be disguised in the garb of expediency? And what other word so aptly expresses the conduct of that mother who forsakes her own child for a time, and places it on the breast of a stranger, in order that she may indulge in the festivities of the ball-room or some other form of entertainment? Is this one of the signs of progress and civilization? Is it natural? Is it human? Is it right? In very truth, it appears to me the most unnatural thing in nature. Even if the foster-mother be sober, it is not unlikely to lead to increase of disease. It is well known what a powerful influence anger, grief, &c., exercise over the quantity and quality of the mammary secretion. Notwithstanding those who are sceptical on this point, I feel thoroughly convinced that the state of the nervous system in the mother when she is suckling does affect the health of her child, not only in body, but most probably in mind also. It is not to be expected that the foster-parent will display that tender emotion towards her nursling, or be so anxious to control her feelings and

passions, as a true mother. And is it not reasonable to suppose that the feeling of exquisite tenderness exhibited by a truly natural mother towards the infant at her breast must have a certain appreciable value in its nutrition and development?

It appears strange, although probably familiarity with the danger makes us despise it, that we do not sufficiently appreciate the fact that much disease is directly produced by disregarding laws of nature, as plain and invariable as those of gravitation and motion. Is it likely that we shall escape disease if we constantly act and encourage actions which we know will assuredly produce it?

If the first proposition be correct, the second follows as a matter of course.

2. That by a more frequent and thorough exercise of the inhibitory power of the Will much disease might be prevented.

This requires no comment, as it is self-evident.

The third proposition, which embodies the main point of my paper, is as follows:—

3. That the efficiency and power of the Will may be materially increased and strengthened by systematic exercise.

Before endeavoring to prove this it will be necessary to make a few preliminary remarks on the constitution of the mind. It is supposed to have, if I may so call it, a trivet nucleus—*feeling*, *thought*, and *volition*,—not three distinct nuclei, but one nucleus, divided into three portions, united together. For the sake of argument, let us presume that these three portions are equal in a perfectly well-developed and well-balanced mind. The different phases of human character met with in our journey through life depend in a great measure upon the proportion in which these three elements of the mental nucleus are combined. For example, one individual is over-sensitive, another is so much absorbed in thought that ordinary matters are overlooked or disregarded, while the third carries out the dictates of his will almost irrespective of his own feelings or those of others. With regard to volition, it is important to bear in mind how intimately it is connected with muscular movements. Commencing in intra-uterine life, and increasing at birth, by degrees, after numerous unsuccessful attempts, muscles, and groups of muscles, move in obedience to a wish. Voluntary observation and adjustment are followed by voluntary control; and, finally, the control of the feelings and thoughts completes the superstructure erected upon, and developed from, the purposeless movements of the infant.

It is generally supposed that the brain is the organ of the mind. But the mental operations carried on within the skull could not take place independently of the senses. Hence mind appears to involve not only the centres, but the peripheral portions of the nervous system. We might even say that it exists in the muscles, and to a certain extent in every organ of the body; that, in fact, it includes body —that the latter is a part of mind. In all probability, there are in each one of us certain innate physical, and therefore mental peculiarities, which may be truthfully expressed by the word 'tendency.' It

is well known how these tendencies may be kept in check, altered in their course, or almost extinguished by judicious moral and religious education, and various external influences, social or otherwise. There is nothing irrational in supposing that these tendencies are dependent upon various physical conditions of nerve-cells and fibres, peculiar to feeling, thought and volition, and that they are probably influenced to some extent by the state of muscles, glands, and viscera. In any case, it does not appear unphilosophical to make a division of cells, fibres, and other tissues concerned, into three groups, corresponding to the three-fold constitution of the mind: (1) affective; (2) ideational; (3) volitional. From our knowledge of other parts of the body, we should expect, by a constant and judicious exercise of the parts involved in each group, increase of cells and fibres in number or size, or both; probably some alteration of chemical composition; and, lastly, more decided and efficient action. Feeling would be intensified, thought refined and elevated, and volition strengthened. Conversely, we should argue that, if the cells and fibres in any one group were allowed to remain in a state of inactivity or sluggish action unduly prolonged, it must be followed by obtuse feelings, intellectual degredation, and an enfeebled, vacillating will; and this appears to be strictly in accordance with our experience.

Use or exercise then begets growth, development, and power. Disuse, or the want of exercise, wasting, degeneration, weakness, and in many instances, extinction. To quote a few examples:—

1. Regular physical exercise short of over-fatigue promotes growth, elasticity of muscular fibre, facility of movement, whilst an undue prolongation of inactivity ends in atrophy.

2. In double organs destruction or inefficiency of one throws more work on the other, and as a consequence enlargement ensues.

3. The loss of one sense increases the acuteness of the remaining ones, because they are exercised more frequently and with greater attention and accuracy; and, further, we know that each of the special senses may become educated and developed by exereise to an extent which is almost marvellous. Is there the same physical condition in the educated and uneducated sense? I think not.

4. The complicated movements of the acrobat are executed with the greatest difficulty at first, even when commenced, as they usually are, during childhood. By degrees, after tremendous repetition, they become more elegant and perfect, and at last almost automatic. And so with the accomplished pianist and violinist, who certainly can execute many airs with scarcely any mental effort. The first few notes serve to recall the association of sound, touch, and succession of movements, and the remainder of the piece is completed automatically.

5. Some authorities contend that memory implies growth of new cells and fibres, and possibly further development of old ones. At any rate memory is vastly improved by exercise, and almost lost if not properly cared for and used.

6. The same effect of exercise, or the want of it, is quite as apparent in the case of the emotions.

In every human being there is, hypothetically, at any rate, a certain quantity or charge of nervous energy, which must eventually be expended in some way or other. There are three directions in which it may travel: the affective, the ideational, and the volitional—all three; or it may chiefly and morbidly be expended in one direction only. Now it is possible to direct this nervous energy into one of these three channels, and in some measure to regulate its force. And not only so, but energy flowing in one direction—say the affective—may, especially in early life, during the period of growth and development, be checked to a considerable extent, and diverted into either the ideational or the volitional channel, one or both. The following may be quoted as a few arguments in favor of this view :—

(*a*) When a little child receives an injury, it is wonderful how a really sharp blow may be rendered comparatively imperceptible by directing its attention suddenly to a bright light or color, a loud or musical sound, or something which acts for the time being with great intensity on some of the fibres engaged in one of the special senses.

(*b*) The powerful stimulation of one set of fibres acts occasionally in direct antagonism to that portion of the nervous system involved in some of the emotions. Mark the effect of music through the medium of the auditory nerve. Does it not calm the passionate, encourage the timid, and soothe the distressed? In these instances the combination of fibres, &c. concerned in the emotions of anger, fear, and grief, become passive, as it were, before the intense stimulation of the nerve of hearing.

(*c*) Are not hiccough and sneezing readily checked by the sudden stimulation of some other portion of the nervous system?

(*d*) Pain—positive pain—vanishes in a remarkable manner when attention is riveted on something else. The disagreeable sensation of cold is sometimes scarcely perceived (as I have myself frequently experienced) when one of the special senses is powerfully stimulated, or the mind deeply engaged in thought.

(*e*) Dr. Broadbent, in his interesting lecture on the Construction of the Theory of the Nervous System, argues that the inordinate action of the lower limbs in locomotor ataxy is due to *concentration of energy* in the nerve nuclei of the lumbar enlargement. He considers that motor impulses passing down the antero-lateral columns are in the normal state distributed to many segments of the cord by the co-ordinating fibres in the white portion of the posterior columns; but, in consequence of disease of the latter, they cease to perform their functions, and the whole force of motor impulse is expended on the nerve nuclei in the lumbar region. The removal of energy by disease from certain portions of the nervous system increases the power of that remaining intact. Hence the activity of healthy nervous tissue appears in certain instances to be increased when some portions are rendered inactive by disease.

(*f*) Last year, amongst my out-patients at the Bradford Infirmary, I met with two epileptics who were sometimes enabled to ward off an approaching attack, in the one case by seizing the right wrist with the left hand and holding it down very firmly on the right thigh for a short time, in the other by starting up and running quickly 200 or 300 yards.

(*g*) It is said that an ague fit may be deferred by putting back the clock unknown to the patient.

It appears, then, that nervous energy may be transferred from one portion of the system to another, or it may be concentrated in a particular direction; and, further, that a morbid activity in one portion may be diminished by arousing the dormant energy in another. Therefore, I believe that systematic exercises which involve the volitional portion of the system may be expected to produce an increase of all parts which contribute to the origin, maintenance, and continuance of healthy volitional action; and, as a final result, bearing in mind the gradual building up of the will on the purposeless movements of the infant, we ought to have an increase in the power of the will. Is it possible that growth and development of muscle can have any conceivable connection with a high moral tone? I believe it is, and for the following reasons:—

1. Emotion is usually accompanied by certain outward physical manifestations which are to some extent under the control of the will. Coexistent with the mental state certain glandular and other effects are produced. Now, by exercising an inhibitory power over the muscles it is possible to stifle, or at any rate reduce, the violence of the emotion. By systematic exercises the muscles develop, become more powerful, act more readily, and thus lead to a more efficient control of the feelings. At the command of the will the muscles are kept at rest, glandular and other effects are less marked, and, finally, the emotion gradually dies away.

2. Mark the attitude of an individual who expresses a determination to carry out his plans. He clenches his fist, stamps his foot, and says with emphasis 'I will' simultaneously, and his muscles generally are in a state of contraction. And is there not a muscular element in that unflinching resolution to bare severe pain without outward manifestation?

3. Muscular exercise produces power and a readiness to act in obedience to a wish which must of necessity engender confidence. This confidence in the ability to act is a mental process springing out of physical strength. What cannot be accomplished by careful preparation? Note the admirable swim of Webb and the prolonged walk of Weston, both feats of prodigious and unexampled endurance. In each case there was undoubtedly an intense feeling of fatigue, amounting to severe pain, and yet they were enabled by a powerful exercise of the will, greatly aided by, if not actually arising out of muscular development, to bring their labours to a wonderfully successful termination. May not any of the emotions be fitly compared with the state of fatigue? And is it not, moreover, true that they are all more or less under the control of the will?

4. But, further, systematic exercises assist in the control of the feelings and appetites—(*a*) *By exhaustion.* It is clear that by expending a certain amount of nervous energy in a definite direction, which must be given off in some way or other, the tendency to take any other direction is greatly diminished. (*b*) *By habit.* By degrees exercises become so much a part of the individual that they are performed as a matter of course. Early rising, for instance, is usually an act for many years of self-denial, but by frequent repetition the effort is reduced to a minimum. Is it not reasonable to suppose that an active vigorous condition of muscle is of material assistance not only in taking the final leap, but in forming the resolution to do so. After a time, indeed, may there not be a certain amount of automatic action about it?

5. Of course, it is not by any means a universal fact, but it is a matter of observation than the woman is more emotional than the man. Has muscular development any share in the production of this difference?

6. Almost every practitioner knows that an individual who has been suffering from acute disease has not that control of the feelings which is natural to him. Has the wasting of muscle anything to do with this?

Now, if excessive selfish indulgence has the morbid influence which I have ascribed to it, then it follows that an increased power of the will, and a more constant and regular exercise of it, must of necessity prevent such disease. It has been shown that some of the more important physical phenomena accompanying states of feeling are directly and powerfully, I do not say solely, influenced by the will; in other words, the muscular movements at any rate may be checked, or almost extinguished, by volitional control. This control is strengthened, facilitated, and made more efficient by systematic physical exercises. Following the same line of argument, I believe that mental exercises of a suitable kind are second only to physical exercises in importance. If this be so, there remains this question, which is well worthy of the serious consideration, not only of each individual member of the medical profession, but of every reformer, statesman, and philanthropist. In what manner, when, and how long should these systematic exercises be employed? Without attempting to give even a sketch of a complete answer, I would merely venture to mention one or two points which have occurred to me:—

1. That systematic physical exercises should take a very prominent place in the training of our youth, irrespective of rank, in both sexes, and they should form a very much larger share of the instruction given in our board schools than they do at the present time.

2. That during the first ten years of life, systematic mental exercises over and above reading and writing should be of a moral nature. The beauties and advantages of truthfulness, temperance, and honesty should be impressed upon the youthful mind, and contrasted in their results with the hideousness and degradation of dishonesty, intemperance, and deceit. Without a shadow of a doubt,

it is far more important during the first decade of human life to point out the difference between right and wrong, and see that there is a decided and proper appreciation of it, than to crowd the brain with facts and figures, or with anything else. It must not be forgotten that physical exercises lose much of their value apart from mental and moral ones, as far as control of the will is concerned, as may be witnessed over and over again in the persons of professional athletes, prize-fighters, and soldiers. The physique of a man may be ever so good, and he may have great volitional control, but it is of little use unless he knows when to exercise that control. As well might you expect a vessel classed A 1, thoroughly well furnished with efficient machinery, able seamen, and judicious officers, but without helm, compass, or chart, to make a safe and rapid voyage to the antipodes.

3. That when children become capable of understanding them, a few simple facts relative to the laws of health should be presented to their minds. This would naturally include the results of non-observance of those laws, and thus the necessity of self-control would be forced upon their attention.

In conclusion, however unpalatable and nauseous the idea, disease appears to be in many instances an evil of our own creation; and I cannot help thinking that the allotted term of three score years and ten might be much more frequently attained, without of necessity entailing a life of rigid ascetcism, by a constant persevering habit of self-denial, steadily and firmly maintained by systematic exercises.

THE DEATH OF THE PRINCESS ALICE.

DIPHTHERIA—THE KISS OF DEATH.

Three or four years ago, in the pages of the Sanitary Journal, reference was made to the communication of diphtheria by means of a kiss. It will now, since the lamented death of the Princess Alice, hardly be doubted that this terrible disease may be communicated in this way. The death of one so beloved and exalted, in the prime of her womanhood, from this scourge, alike of the high and the low, cannot fail to attract to it and to its etiology more attention than has heretofore been given in this direction.

Seven members of the Grand Ducal family of Hesse-Darmstadt were prostrated by this disease in November, two of whom died. The British Medical Journal asserts, that all the cases—though the first should no doubt be excepted—were caused by direct infection, doubtless by kissing.'

It is very well known that diphtheria in adult persons is often so mild as to be mistaken for an ordinary sore throat; and yet the specific disease may be communicated to a child, and by a kiss. The greatest care and thoughtfulness should be exercised in these cases of simple sore throat, as in the severer cases; and it should be constantly borne in mind that the kissing of children at such times is most dangerous.

Diphtheria is universally regarded as being, in its origin, in some way closely connected with—as the offspring of, decomposing organic, especially excremental matter; and it is piteous in the highest degree that it may be thus unwittingly fastened upon a loved one by a parent or child, a lover or friend, along with, and by means of, the highest and most endearing mark of affection—a kiss.

The beloved daughter of our universally beloved Queen, who has so recently been the victim of this terrible malady, contracted in a way which has been well described by Earl Beaconsfield as 'wonderfully piteous,' had been, it appears, considerably interested in hygienic work. During the Franco-Prussian war a hospital was built under her auspices, and called by her name. She went out to meet nearly every train that arrived with wounded soldiers, and visited the hospital two or three times a day, and, it is said, knew nearly all the bed patients by sight, and remembered in many cases the nature of their injuries. A large part of her palace was given up to the work of preparing necessaries for the wounded, and most of her time was given to the sick and wounded. Truly such a life and its influences are of inestimable value.

The brief notice of her life, and history of circumstances relating to the disease which brought it to such an untimely end, in the following extracts from the *Medical Times and Gazette*, of Dec. 21, will doubtless interest and instruct many of our readers:

We cannot allow the present number of the *Medical Times and Gazette* to go from our hands without a brief expression of the deep concern of the Medical profession at the great loss the Queen has sustained by the death of the Princess Alice, and of their warm sympathy in her sorrow. . . . . Of a singularly bright, gracious, sympathetic, and most loving and loveable nature, and richly and rarely endowed with mental gifts, the Princess presented in rare perfectness, as daughter, sister, wife, and mother, all the qualities of heart and head of the highest, purest and sweetest type of woman. Her life was one of loving care for, and happy devotion to others. Whilst still a very young woman she was a brave, skilful and untiring nurse to her father in his last illness, and then the comfort and support of her mother. Next we heard of her winning the love and admiration of the people of her adopted country by her quick, ready, and practical sympathy and help in their trials and anxieties. When the Prince of Wales was sick nigh unto death, she left her home for a time, to watch by his bedside and aid to restore him to health. And lastly, she devoutly nursed her own children and her husband through their late illness; and caught her fatal disease by an instinctive act of motherly love and devotion that has moved every heart by its pathos. The teaching of such a life is invaluable; and none know better than do medical men the vital and deep influence of such a domestic atmosphere as that the Princess spread around her, on the health of mind and body of all within its reach. Such living teachings as hers make the men and women who are the strength and salt of a nation.

The malady which caused her death run such a remarkable course among the members of the Grand-Ducal family, that, altogether apart from the sad issues it has had in at least two instances, the outbreak would constitute a very valuable field for study. The curious thing was that it should be strictly and entirely limited to the Grand-Ducal family, and have attacked no one of the many attendants in the palace, or even those more immediately surrounding the sick folks. The epidemic began on Nov. 6; the eldest Princess, Victoria, aged sixteen, was attacked. Five days elapsed, and on the night of the 11-12th November, Princess Alice, aged six; on the day of the 12th, princess Mary, aged four; and on the night of the 12-13th, Princess Irene, aged twelve, were successively attacked. On the afternoon of the 13th, the son and heir of the Grand-Duke, Ernest Ludwig, aged ten, the Hereditary Grand-Duke, was similarly seized; and on the 14th the Grand-Duke himself became in turn the subject of the disease. Thus in the eight days from November 6 to 14, the whole of the family, with the exception of the Princess Elizabeth and the Princess Alice herself, were attacked with the formidable malady; but the interval which elapsed between the first and succeeding cases is to our mind most significant, for, as it seems to us, it clearly points to the Princess Victoria being the source of the illness to the rest of the family. By some means yet unknown the disease originated in her, and then, by means evidently of the most strictly limited kind, was successively spread among the other members of the family; but not apparently to all, for the onset of the malady in the case of the Princess Alice came much later; and it is most probable that the fatigue and mental distress she had gone through during the illness of her husband and children was one of the main factors in causing in her its fatal issue.

Looking at the outbreak from a purely scientific point of view, the first thing to be noted is the causation of the epidemic. The physicians affirm that it came from without; and in support of this they allege the violent characteristics of the disease from the very beginning in the Princess Victoria. But they also seem to think that the children were unusually prone to the mischief, inasmuch as all had suffered very frequently from acute and chronic affections of the parts. This will again, to the minds of most medical practitioners in this country, suggest a doubt as to the soundness of the view taken by these gentlemen as to the cause of the disease. Repeated attacks of tonsillitis are commonly considered indicative of an indifferent constitution, or of exposure to unhealthy influences. In the case of the Grand-Ducal family, we have no reason to believe that the former is the case, but it is not so clear that the latter influence has not been at work. The New Castle, which was built in 1864, is in every respect, we are assured, perfect as regards sewage and ventilation, and its position high up on a hill renders this all the more likely. Moreover, we have the authority of Mr. Spencer Wells for saying that Dr. Ergenbrodt, who makes this statement, is one in every

way qualified to give such an opinion. But we believe that the Old Castle, where the family passed much of their time, was very far from being in the sanitary state a regal palace should command. Most of our readers will remember the repeated outbreaks of illness which occurred in the Prince of Wales' family and suite until the cesspools of Marlborough House were discovered and cleared out; and some may know what is now the condition of things in the War Office in Pall-mall. There is, unfortunately, reason to believe that the Old Castle or Palace of Darmstadt was, or may be is, in a somewhat similar condition. It is a received application of a well-known axiom in this country: whenever sore throats of a bad, what used to be called a putrid, kind recur again and again in a household—look to your drains. And it is quite possible that some such or similar causes may have given this tendency among the children of the Princess Alice to the sore throats referred to, and possibly to the fatal diptheria.

But whatever may have been the cause of the Princess Victoria's illness, direct infection or gradual blood-poisoning, the history leaves little doubt that the illness of the rest of the family could be traced to her. True, the Princess, as soon as the nature of the malady had been discovered, was separated from the others, but probably the mischief had been done before the exact nature of the malady had been ascertained; and the fact that the rest of the family were attacked in such rapid succession distinctly points to a common source of infection, both as regards time and place. The intervening period of from five to eight days is exactly that known to occur where diptheria has been clearly traced to infection. As to the mode of infection, the physicians distinctly indicate a mode of propagation so powerfully indicative of domestic affection that it adds a pang to the sad story of this fatal outbreak. That the affectionate intercourse of parents and children with each other should be converted into a minister of death is mournful beyond conception. Yet so it has been; and Lord Beaconsfield, in his speech in the House of Lords, brought this home to us with a fulness of pathos which cannot fail to deepen the regret for the lost Princess wherever and whenever her story is told. He said, 'My Lords, there is something wonderfully piteous in the immediate cause of her death. The physicians who permitted her to watch over her suffering family enjoined her under no circumstances whatever to be tempted into an embrace. Her admirable self-restraint guarded her through the crisis of this terrible complaint in safety. She remembered and observed the injunctions of her physicians. But it became her lot to break to her son, quite a youth, the death of his youngest sister, to whom he was devotedly attached. The boy was so overcome with misery that the agitated mother clasped him in her arms, and thus she received the kiss of death. My Lords, I hardly know an incident more pathetic. It is one by which poets might be inspired, and in which the professors of the fine arts, from the highest to the lowest branches, whether in painting, sculpture, or gems, might find a fitting subject of commemoration.'

OVER-DENSITY OF POPULATION IN CITIES.

The question as to the dangers, *(Scientific American)*, both to life and health, that result from an overcrowding of the population in large cities, has lately received a new treatment at the hands of the learned Dr. Farr, by the labors of whom the subject has been reduced to a science of almost mathematical exactness. In a paper entitled "Density of Proximity of Population, its Advantages and Disadvantages," recently presented to the Congress at Cheltenham, England, by this excellent authority, the statistics shown are somewhat startling, and put forth in such a way as to prove exceedingly interesting and instructive. Dr. Farr's principle is this: "Observe the effects of the population-density; as a rule, the greater this density the shorter the duration of life; and this life-duration is seen to follow a ratio appreciable by simple arithmetic."

That man by his very nature is gregarious in his habits, and that, following the dictates of his nature, it is his wont to congregate in dense communities, is a fact so well known, and one that has been so often commented upon, as to appear trite in its repetition. We cannot, perhaps, expect to accomplish much in the way of changing his habits in this respect by moral suasion, the best we can do being to exhibit the results that modern science has arrived at in its investigations of the subject of overcrowding, not so much to the sufferers themselves from this state of things, as to the authorities whom they have elected to look after their welfare. The gist of the matter is given by Dr. Farr in the following words: "The nearer people live to each other the shorter their lives are," and the relations of this proximity to the duration of life are ascertained to be as follows:

"In round numbers, where we stand on an average 400 feet off from each other, we live on an average 50 years; where we are 300 feet off, we live 40 years; where we come within 60 feet of each other, we live but 30 years; and where we are but 20 feet off, we live but 25 years. It does not seem likely that by extending our interspace beyond the 400 feet we could prolong the average of life beyond 50 years; but it is very clear that if we contract the interspace beyond the limit of 20 feet we must rapidly reduce the mean of 25 years to 20, to 15, to 10, and before long, so to speak, to nothing. That is to say, there is a certain population-density with which, in the ordinary circumstances attending such a condition, human life could not be sustained at all; and from this melancholy zero there rises a scale of progression, obeying, of course, a recondite, but intelligible mathematical law, whereby we may measure off in a moment, according to the number of lives per acre, the number of years of life." Again, from Dr. Farr's actual figures we learn that "during the decennial period from 1861 to 1870 inclusive, the death-rate of certain of the most favorably situated districts of England, taken at per 1,000 of the population, proved to be 17 per annum, 16, and even so low as 15; whereas in certain other places it stood at 31, 33, and even 39 per 1,000 per annum. He then tells

us that in those cases where 16 died in 1,000, each individual had to himself, on an average, 4 acres; where 15 died, each had 3 acres; whereas where 31 died, each had only one-tenth part of an acre on an average; and where 39 died, each had only one one-hundredth part of an acre. The writer then goes on to show that, as regards the intermediate cases, the regularity of the rule is sufficiently precise." It further appears that the densest and most unwholesome of the districts in England is Liverpool, where a square mile holds no less than 63,823 human beings—an average of about one-hundredth of an acre to each, or equivalent to a space of 12 by 12 feet. Thus it may be readily seen that if the men, women, and children of the lower order were to be placed on a surface of level country, each person being 12 feet from the next, and if the dirt, destitution, intemperance, and disease, coupled, of course, with the toil of this class, were conditions present in full force, 39 out of 1,000, or say 1 out of 25, must die annually. In other words, the average duration of human life must be as low as 25 years.

Such are some of the more important of the interesting facts given us by Dr. Farr in his valuable paper. The *Architect*, to which we are indebted for an abstract of these conclusions, remarks very truly that "no doubt the local circumstances of any particular community must always exercise a considerable influence on the death rate. It is scarcely necessary to say that it is not so much the crowd that kills, as it is the conditions under which the crowd accumulates; the conditions of soil and climate, of the contamination of air and water, of the disposal of refuse, of food supply, of the consumption of strong drinks, and of social character and habits in various ways, whether in labor or in idleness." While there is no doubt that such conditions as these exercise a large influence on mortality in large cities, there is also no doubt that the death rates in such communities are pretty certain indices of the perfection or imperfection of municipal arrangements in regard to sanitary matters.

BAKING POWDERS.

A variety of baking powders and prepared flours are coming into general use, and their bearing on health and disease should be considered. Few know just what these compounds contain. The following extracts from the *Scientific American*, by Professor Peter, M.D., &c., may awaken some interest in this matter in this country:

The obvious fact is, as proved by the analyses of baking powders by others as well as by myself, that desiccated alum is substituted for cream of tartar in many of our popular "baking powders." The United States Patent Office has sanctioned this use or abuse of alum by their letters patent, and alum is very much cheaper than cream of tartar; answers equally well to set free the carbonic acid which makes the bread light, and may also make a whiter loaf than that dearer article. The manufacturer can make more profit at a lower selling price, with alum powder; more especially if he mixes them with a large proportion of starch. . . . . .

There is no alum in the bread or other article prepared with these powders. but only the products of its decomposition, viz. : Glauber's salt, and at this point a new question arises, and one of weighty import : Is it not probable that the continued ingestion of aluminum hydrate with our daily food, may, in the long run, induce disease and shorten life ?

It is more probable that at least a portion of the aluminous compound is retained in solution in the acid chyme and is absorbed into the blood vessels in the coats of the stomach, to act locally in thickening or otherwise altering their delicate coats ; or meeting with the slightly al aline venous blood, rich in albuminous compounds, to induce a tendency to coagulation, which, however slight, may in the course of time cause obstructions in important glandular organs, especially in the kidneys and liver, interfering with their healthy functions, and in the end causing fatal disorder.

The portion of the albuminous compound which is not absorbed from the stomach will doubtless be decomposed in the duodenum, where it will be rendered insoluble by contact with the alkaline bile ; but in the cæcum it will again be subjected to an acid solvent, and a second danger of absorption consequently occurs. These are probabilities of deep import. Aluminum chloride, like tin chloride, forms insoluble compounds with albuminous, gelatinous, and other organic matters, and when introduced into the blood in quantity cause sudden death, and doubtless when taken up in repeated minute quantities, will cause alterations of tissues and coagulations of the circulating fluids resulting in obstructions and disease.

That alumina is not friendly to organic life is shown by its almost general absence from the composition of vegetables and animals. In only a very few plants of the lowest order is it found as a regular constituent. The propriety of introducing it into our daily food is not properly to be ascertained by costly and broadly hazardous experiments upon the people at large, or with the object of cheapening the production and increasing the profit on baking powders. Nor is there any necessity for such heroic tampering with the public health. Why lay aside the time-honored yeast or ferment, which, when skillfully and carefully prepared and used, is without injurious influence ? Or, if we must have "quick-rising," why not use the pure cream of tartar and good bicarbonate of soda until something equally harmless is discovered ?

The writer is informed that there occur many more cases of Bright's disease and other forms of disease of the kidneys than formerly. Are we to attribute this to chloride of tin in glucose sirups and sugars, or to alum in baking powders, or are not both very liable to suspicion ?

Even the cream of tartar baking powders may come in for some share of guilty responsibility because of the greater amount of alkaline salts determined to the kidneys by their habitual use, and that most *chemical* of all baking powders, Horsford's, which, with the commendation of Liebig might seem to be pathologically innocent, as

it is chemically excellent, may yet, by a possibility, give to the renal organs too much earthy phosphates to excrete in solution. "Give us," therefore, our "old-fashioned daily bread" until something better is discovered than is found in all the baking powders.

COSTS OF SICKNESS AND DEATHS IN ONTARIO.

About 30,000 persons—men, women and children—die every year in Ontario. About 14,000 of these, in round numbers, die before reaching their 20th year, and 12,000 between the ages of 20 and 70 years. It is estimated that the 14,000 who die under 20, live in all 50,000 years; or an average of not quite 3 years and 7 months each. It does not cost less, on an average, than $50 per year to maintain—feed, clothe, educate, etc.—each child or youth under 20 years; and they are not, on an average, producers, but consumers, under this age. And so the 50,000 years of life, lost, at a cost of $50 per year, involves an outlay of $2,500,000. And this sum is paid annually from the earnings and estates of the people of Ontario for the maintenance of those who die before reaching the productive period; and to this amount is diminished, yearly, the income or capital of the province, without the slightest return or benefit to the province.

Now if all of the 12,000 who die between 20 and 70 years of age lived on through the 50 years and reached 70, they would labor, or contribute in some way to the income of the province, 600,000 years (12,000 × 50). Instead of this, because some die at 30, some at 40, and so on, it is found that they each only live, and labor or contribute, on an average, 23 years, instead of 50, less than half, causing an annual loss of 317,000 years of life. Each of these years, of man or woman, is worth $300 to the province, less than $1 per day. Multiply 317,000 by 300 and the product is 95,100,000. And thus the province suffers a loss, by reason of these 12,000 dying between 20 and 70, of $95,100,000. Hence Ontario loses, every year, by the deaths alone of those under 70 years, $97,600,000.

The above estimates as relate to the number of deaths at the different ages, it may be stated, are based on the returns of deaths to the Registrar General of Ontario, and on the returns of Great Britain and Massachusetts.

The loss by sickness counts up to many millions more. Estimates based on the records of the many benevolent societies in England, the members of which receive a certain sum when disabled by sickness, show that there for every death there are two constantly sick; or, in other words, there are 730 days of sickness (365, the number of days in the year, multiplied by 2) for every death in the year. The records of the benevolent societies do not include the lighter ailments, and only those requiring medical attendance. It appears, from certain health insurance companies started in the United States, that, there, the sickness-rate is greater than this. So that in Ontario

the proportion of sickness is doubtless not less than in England. With 30,000 deaths annually in this province, then, there will be annually 21,900,000 days of sickness. Sickness must cost, on an average, for medical attendance, nursing, etc., not less than $1 per day. At this rate, certainly a reasonable estimate, the sickness in Ontario costs the people every year $21,900,000.

Furthermore, assuming that there is the same relative proportion of sickness as of deaths among those above 20 years of age, 40 per cent. of the sickness affects those in the working period. There will, therefore, be 8,760,000 days of labor lost to the province. These at $1 per day, excepting Sundays, involve a loss of about $7,500,000.

The entire sum, then, actually lost to the province, every year, through sickness and deaths, amounts to $127,000,000. Besides this actual loss, there are losses through sickness which it is impossible to estimate; losses in stamina, in physical and intellectual vigor, too great, and too far reaching upon future generations, through heredity, for one to form conception of; but which, if unchecked and disregarded, might result in the degeneration and final extinction of the race.

What proportion of this loss may be prevented? The greatest practical sanitarian probably that ever has lived, Mr. John Simon, stated that, in England, one-third of the sickness and deaths may be prevented, by the practical application of the present knowledge of sanitary science. If one-third can be prevented in England, where much has already been done for the public health, it is highly probable that one-third can be prevented in Ontario, where little or nothing has as yet been done for promoting the public health. And this could be done with a comparatively small outlay of money, and a little intelligent effort on the part of the people, and over $40,000,000 might be saved thereby.

THE LEGISLATURE AND THE PUBLIC HEALTH.

The second time the Lieut.-Governor, in opening the Ontario Legislature, has commended to the attention of the members of the House the subject of public health. Last year a beginning was made by the appointment of a select committee of the House to consider the subject. The committee reported that 'means should be taken to disseminate information and to educate' the people; that 'a more effective system of administration for securing this should be applied;' and that 'further provisions are necessary' to make more efficient the authorities under the present Public Health Act.

The replies received by the committee to questions sent to numerous medical practitioners in the province showed almost complete unanimity among the physicians as to the necessity existing for the education of the public in sanitary matters. And it is

undoubtedly of the first importance to educate, and so create an interest in the public mind in reference to health, after which any compulsory measures will be better received and attended to. In England, while much has been done in the last forty years to improve the public health, progress in this way has been very slow, chiefly because no special means were ever employed to educate the public in health matters; and sanitarians are but recently it seems becoming alive to the importance of this part of the work. In Prussia, it appears, and in many of the United States, the education of the public was the first object, and in some of the States much has been done in a short time.

It appears to be unusual for parliaments to do much in the way of legislating on important matters during their last session, just before an appeal to the country, and we cannot expect complete comprehensive public health measures, such as the province really requires, but which in truth it is hardly ready for, during this session. The fact is, however long measures of this kind, affecting the masses of the people, may be deferred, it requires years of time to get them in proper working order. Acts must be passed and amended, and added to and improved, as the people become prepared for such amendments and improvements, and as the wants and requirements of the people become known. It is, therefore, the more necessary that some commencement be made in legislation, without delay—some act passed upon which future work or enactments may be based or spring from.

If delays are ever dangerous they are certainly so in matters affecting health and life. Every day, on the average, in Ontario, from one cause or another, over 80 human beings yield up their lives and meet death. About 27 of these are little children under five years of age; 10 are between the ages of five and twenty; and 30 are between twenty and sixty,—in the prime of their manhood and womanhood, fathers and mothers, leaving much unfinished work and children fatherless and motherless. And thousands, at all ages, are languishing and suffering in sick-beds. One-third, at least, of these deaths and of these many cases of sickness are doubtless caused by diseases which may be prevented,—diseases arising through ignorance, or carelessness, or neglect. Who is responsible? Unquestionably legislation should aim at protecting the people, as well from the ravages of diphtheria, typhoid, scarlet fever, and the like, (often making raids upon them from their neighbors' premises,) as from foreign epidemics, or foreign hordes of murderers. And the people will soon learn not to respect that legislation which does not seek to aid them in preserving their health and lives.

Evidently something will be done now for the promotion of the public health, and there is reason to believe that whatever is done will be worthy of, and acceptable to, an intelligent and wealthy provincelike Ontario. It would be positive extravagance to delay, and a cry of economy in reference to it would be quite out of place.

A VITDOTE TO BAD AIR.—Dr. Golden of London (Brath Ret. No. 77) gives a simple method of purifying air when so offensive as to be totally unfit for breathing. He says it has been tried on small and on very large scales, and never failed in its results. It is used in hospitals, large school-rooms, slaughter-houses, tanners's yards, the lower decks of ships, where several hundred seamen have made the atmosphere so impure during the night as to be most offensive to any one from the outside suddenly entering.

Dr. Goolden would disabuse the public of a notion—that the evolution of carbonic acid gas, as the noxious element, is the cause of the mischief we want to rectify. The offensive matter is sulphide of ammonium, hydro-sulphuric acid, and other still more poisonous gases of which sulphur is the base. So poisonous is this gas that one volume added to 1,500 volumes will kill a small bird: and one volume to 1,000 will kill a middle-sized dog instantly; and one volume added to 250 its volume of air will kill a horse. This when existing in the atmosphere in an exceedingly small quantity is most injurious to animal and vegetable life—in fact, it is poisonous in proportion to its quantity. It is constantly secreted from the surface of the living body, and evaporates into the air. When crowds of people are assembled in a room the air becomes very poisonous; but fortunately the chloride of lead destroys it by attracting it with the strong force of double electric affinity. The sulphur combines with the lead, and hydrogen with the chlorine, and the sulphur will combine with nothing else if lead be present, and the combination is perfectly insoluble, so that it involves no fear of lead poisoning.

The mode of using it is: Take a drachm of nitrate of lead, and dissolve it in a pailful of soft water (rain water or distilled), and take a drachm of common salt, which dissolve in a jug of soft water, and when the solutions are mixed it is ready for use. Dip a towel into it and hang it up in the offensive room. The strength might be very much increased, but for ordinary purposes this quantity is quite sufficient; and if not, more may be made with very little trouble. It is important to understand why soft water should be used. If there is any lime in the water there will be carbonic acid, and a precipitate will be formed of carbonates of lime and of lead. If it is unavoidable, the precipitate must be allowed to fall, and prevented from mixing with water or sewage falling into rivers or springs, otherwise you may get lead poison. Dr. G. advocates ventilation at the same time.

DON'T BE AFRAID of the little currents of fresh air coming in around windows and doors. Regard them rather as kindly little messengers striving, though too often all in vain, to keep the air within pure, and to bring in a supply of oxygen. If your rooms are not provided with special means for constant ventilation, don't stuff the cracks and crevices too tightly with listing or anything else, but burn a little extra fuel and let in plenty of fresh, pure air, if you wish to live, healthy and vigorous, through the winter. It is the worst sort of economy to make living and bedrooms air-tight in order to save fuel. Saving coal and wasting health and life.

FATALITY AMONG INEBRIATES DURING EPIDEMICS.—The recent outbreak of cholera in Asia (*Quarterly Journal of Inebriety*) with its extreme fatality, recalls the distinctive morality among inebriates which has characterized the march of this and other epidemics in modern times. We select illustrative statistics of the cholera epidemics 1832. In St. Petersburg, out of 10,000 deaths only 145 were known to be temperate; in Moscow, only 2 out of 6,000 cases were temperate. This fact so alarmed the citizens that nearly all the population ceased to use alcohol; of 30,000 victims in Paris, nearly every one used alcohol, in some form, to excess; nine-tenths of those who died in Poland, were of this class. In some towns *every* inebriate was swept away. In Tifflis *every* drunkard died. In the Park Hospital of New York city, only 4 persons were temperate in 200 fatal cases. In Albany, there were only 7 out of 326 fatal cases who were not inebriates. In the late epidemic of yellow-fever in the South, the percentage of victims among inebriates was nearly as large. These are not extraordinary facts, but follow, naturally, the degeneration produced by alcohol, and are readily explained by the low vitality and lessened power of resistance to toxic forces and agents present in every inebriate. Most unfortunately, this condition is not realized by either the patient or friends until it is too late. The continued use of alcohol keeps up the delusion of strength and vigor; but with the onset of disease all is thrown off, and only the physician and surgeon can realize their hopeless condition,

CLEANLINESS OF SCHOOL CHILDREN IN GERMANY.—We are accustomed to look upon the Dutch as a sleepy, stolid nation, exceedingly slow to move in the direction of reform and progress. But in several important sanitary respects they are far ahead of us. They have had for thirteen years compulsory registration of infectious disease, and we now learn that at their best schools there is always beside the teacher an attendant who sees to the personal condition of each child upon entering the school each day. This is a step in the right direction. "Cleanliness is next to Godliness," is a very delightful aphorism for the heads of copy-books, but it is likely to be of much greater service to the child if it is practically demonstrated to him than if it is merely the medium of teaching him how to form pothooks and hangers.

TESTING AIR AND WATER.—Mr. Watson writes in the London *Times* that as the fees of the analytical chemist are beyond the means of many, a few simple test papers might be prepared and used for many purposes. Certain cards should be prepared and hung in closets, which by changing color, would immediately betray the presence of sewer-gas in the atmosphere. Other papers might be prepared for testing the purity of water or tea, or other articles of daily consumption. The paper for testing water would immediately, should lead be present, betray its existence; the papers for testing tea would betray the presence of copper and so forth. The papers might be prepared in packets and labelled. These test papers would be very inexpensive, and could be used by the most inexperienced with confidence.

ELECTRIC LIGHT.—The recent discoveries in relation to the production of artificial light for domestic and other purposes are of great hygienic value, especially as regards the eyes, and likewise, doubtless, the air we breathe. The secrets of Edison's electric light (*Druggists' Advertiser*), which has created such universal excitement in the scientific world, have just been revealed, though the principles of their application will not be disclosed until fully protected by patents. The light is produced by incandescence. The conductor, which is made incandescent by the electrical current passing through it, is a small, curiously shaped apparatus, consisting of a high alloy of platinum and iridium, which cannot be melted under 5,000 degrees Fahrenheit. A sufficient quantity of this metal is placed in each burner to give a light equal to that of a gas jet. Devices of exceeding simplicity, and, as repeated experiments have proved, of equal reliability, are connected with the lamp. They surmount the apparent impossibility of regulating the strength of the light. The lamp, when placed in the electric circuit in which a strong current circulates, is absolutely independent of the strength of the current. This Edison considers one of the vital features of the invention. Thus, if the regulator is set so that the light gives only, say, ten candle power, no increase in the strength of the current will increase its brilliancy. The lamps used give a light by incandescence, constant and unwavering, of five, ten or fifteen candle power. It gives off no deleterious gases. No consumption of material takes place, and the proportion of heat to light is infinitely less than that from a gas jet.

THE BATH.—If every man and woman in Canada could be induced to take every morning a cool bath, as cool as the system or constitution would bear,—a sponge bath, say,—a wash all over, simply, just as they, for the most part, wash only face and hands, it would impart such life and vigor into the people as would give a greater stimulus to work and business generally than could be given by the best legislation in the world. And the bath, by keeping the pores of the skin open, and rendering it less susceptible to sudden changes in the weather, would also tend greatly to prevent inflammations and other diseases arising from 'colds,' and many forms of chronic sickness. All that is essential for this bath is a quart or two of water in a dish, and a course towel; the warm hands being much better for applying the water—more agreeable, or less disagreeable, to the skin than any sponge or any bathing cloth or mits. Only those who have used this bath for some time can form any fair estimation of its value.

THE "INDEX MEDICUS."—We have received the prospectus of a new publication with this title, to be compiled under the supervision of Dr. John S. Billings, Surgeon U.S.A., and Dr. Robert Fletcher, M.R.C.S. It will be a record of all the publications in medicine, surgery, and the collateral branches, and will be published monthly by F. Leypoldt, New York. It will also contain the titles of all valuable original articles that appear each month.