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SEWERAGE.

BY WM. OLDRIGHT, M.A., M.D.

Lecturer on Sanitary Science, Toronto School of Medicine.

Going back somewhat in the more natural order of my subject I propose to make a few remarks on the

CONSTRUCTION OF DRAINS.

And first of all it will be necessary to the completeness of a paper on this subject to say something of the

1. MATERIALS of which they may be constructed. *Tiles* answer well up to a diameter of 18 inches. Of these, the glazed pipes are best adapted to prevent soakage. It will be necessary to see that they are not too porous, that they are strong, tough, and true-fitting. Their porosity may be tested by weighing them when thoroughly kiln dried and again when soaked in water, and noting the difference in weight. Their strength is generally tested by putting them under a weighted lever, arranged like the arm which carries the weight of a safety valve. They should be true-fitting, for any defect in centour will affect the formation of the joints and give rise to leakage.

Iron pipes. If it be intended to use pipes of a larger

diameter they should be made of iron. Their brittleness must be tested as in the case of tiles by letting certain weights fall on them from certain heights. If they are not able to withstand the shock of workmen jumping down unto them, &c., without cracking, they will allow leakage and sewage pollution of the soil.

Brick must be our chief stand-by for large drains and sewers. They must be very hard and impenetrable, not like many of the old second-hand specimens which have been put into some of our Toronto sewers—not many I am glad to say. For the bottom, especially, they must be hard to withstand the grinding and polishing action of the passing solid contents. Their porosity and strength may be tested as with the tiles.

Concrete has been used but not very extensively or with much success.

And lastly we come to the more primitive material *wood*, either in the form of the box drain, or less frequently as fashioned by the coopers' art.

2. THE SHAPE of drains is a very important consideration, and must vary with variations in the amount and character of the fluid which they are intended to convey. So important is the shape of a drain that on it is founded the division of drains into the *deposit sewers* of the olden time, and *self-cleansing* sewers. In old times these sewers used to have to be cleaned out by scavengers, with the same regularity as chimney sweeping. This was due to the fact that the bottoms were broad and flat, and the slow sluggish stream was not sufficient to carry off the solid matters which settled as a deposit, and a deposit once commenced increased by its own impeding action. The same plan is still followed with our box drains, and I might here throw out the suggestion that where box drains have to be used they ought to be set angle down, (and not flat) so as to allow as little surface as possible for the accumulation of deposit, and to give the fluid its greatest possible depth and force.

The best shape for sewers will be *circular* or *ovate*, accord-

ing as the flow is expected to be equable or variable; and as the latter is most generally the case, the ovate form is the most generally preferable. If the flow be equable the circular is preferred, because it gives the greatest capacity with the least expense of wall. If it be variable the ovate gives the advantage of the deep narrow stream when the quantity of fluid is small.

3. The FOUNDATION or bed of a drain should be firm and solid, so as not to permit of any breaking or disjointing. If pipes be used, small excavations should be made to receive the shoulders, and not have the whole weight of pipe, contents and superincumbent earth rest on the shoulders with no support to the rest of the pipe, which is then liable to break or crack. Provision should be made for carrying away subsoil water, which is liable to make for the new earth formed in digging the bed of the drain. If the drain lie *in* a porous stratum and *over* an impenetrable one the chances of the water running along the course of the drain will be especially great. Some tiles are made with a subsoil space, porous or perforated so as to carry off this water.

4. JOINTS. I have already alluded to the necessity of having the joints true-fitting, so as to prevent gaps out of which the cement or clay may fall or be forced. This same may occur if proper care be not taken to prevent the apposed ends from losing their concentricity when laid. If the joints be fitted with puddling clay or other soft material, this will give way before the downward pressure of the small end of the pipe, until this latter rests directly on the receiving collar of the next pipe, leaving no space between them on the under wall, but a large gap on the upper. This will be especially the case if no spaces have been cut to receive the shoulders. To prevent this the joints should be stuffed with oakum, or better still, with lead. This will also prevent the intrusion of rootlets of trees which are apt to insinuate themselves and cause accumulation and choking. Some have tried to kill rootlets by mixing bichloride of mercury in the cement. This is, however, but a poor, temporary expedient at best.

5. The COURSE of drains should be as far as possible in straight lines, as few curves as possible, and at points where bends and junctions do occur, the slope should be increased a little.

(*To be continued.*)

THE PREVENTION OF PUTREFACTION AND THE DESTRUCTION OF CONTAGIA.

BY JOHN DOUGALL, M.D.

[Read before the Medico-Chirurgical Society of Glasgow, April 2, 1875.]

The truths involved in the consideration of the prevention of putrefaction and the destruction of contagia seem to me enveloped in a dense nebula of unwarranted assumptions and conflicting hypotheses. I think it imperative, therefore, instead of unheedingly passing through this thick haze, and at once laying hold of facts, to go through it leisurely, examining its constituents and measuring its extent, until we reach some rays of the small clear light sparkling in its centre.

With this object, I have arranged the two divisions of my paper into three parts:—1st, the nature; 2d, the alleged causes; 3d, the prevention of putrefaction. 1st, the nature; 2d, the origin; 3d, the destruction of contagia.

1st. THE NATURE OF PUTREFACTION.—Putrefaction is a process of reduction. A familiar law in the chemistry of organic bodies is, that the greater the number of equivalents of elements forming the atoms of a compound the less is the stability of that compound. This instability is augmented in animal bodies by their containing nitrogen, which of all the elements has least tenacity in its affinities. Also by the large quantity of water naturally present (about 75 per cent. in muscle), which furnishes a most favorable medium for putrefaction. The chemical forces exercised by the living tissues on vital organic compounds ceasing at death, the several elements of the original compound combine to form bodies less complex, but more stable. It is this combination which constitutes putrefaction, as follows:

Chemical Aspects of Putrefaction.—The chief elements in animal matter are oxygen, hydrogen, carbon, nitrogen, phos-

phorus, and sulphur. The hydrogen unites with the oxygen to form water, with the nitrogen to form ammonia, with the sulphur, phosphorus and carbon to form sulphureted, phosphureted and carbureted hydrogen gases. The oxygen also unites with the carbon to form carbonic anhydride. In course of time the ammonia is oxidized into nitrous and nitric acids, and water; the sulphureted hydrogen into sulphurous and sulphuric acids, and water; the phosphureted hydrogen into phosphoric acid and water; and the carbureted hydrogen into carbonic anhydride and water.

Physical Aspects of Putrefaction.—A delicate film usually at first appears on the surface of the (animal) fluid, which, seen by the microscope, consists of millions of motionless opaque specks—size, from $\frac{1}{40000}$ of an inch and less. These are embryonal bacteria in a vertical position. A few hours later, countless myriads of free swimming organisms are seen, accompanied by fetor and turbidity. In from nine to twelve months the specific gravity of the fluid—at first perhaps about 1·6—is at zero, or at most 1·1. Life, odor and haze are all but extinct, and the fluid gives no response to the tests for albumen—in short putrefaction is expended.

2d. THE ALLEGED CAUSES OF PUTREFACTION.—In regard to these there are two schools of opinion. One holds that bacteria and their allies are the likelier cause, of which, perhaps, the ablest exponent in this country is Sanderson. In a lecture published in the *British Medical Journal*, on the 16th of January last, at page 71, he states what is now well known, and what I think was first enunciated by Pasteur, "That bacteria, like plants, do not require albuminous compounds for building up their protoplasm; that ammonia is sufficient to supply them with nitrogen; and therefore," he says, "it is more than probable that in septic processes they derive their nitrogen and carbon, not from the albuminous compounds themselves, but from their ultimate products. This being the case," he continues, "we must regard bacterial life, so far as it consists of the building up of new protoplasm, as a process consequent on putrefaction; nor disintregation must have proceeded to the production of ammonia before new integration could take place." But while admitting this, he adds, "It is not rendered more or less probable that bacteria are the efficient cause of putrefaction; there is not the shadow of any objection to the assumption that on the one hand bacteria derive material for the integration of their protoplasm from the products of disintegration of the soil in which they flourish,

and on the other, that they produce the ferment by which disintegration is determined." Now, in the following lecture, Dr. Sanderson plainly speaks as if the latter proposition were not an assumption, but a truth; whereas the first proposition is a proven fact, and the second merely an assumption. Hence, it may be definitely asserted, that putrefaction precedes the appearance of organisms; while his view, that these, while invisible, may also cause putrefaction, is merely a supposition.

Another argument in favor of the bacterial origin of putrefaction is, that it is always accompanied by organisms; another, that if these be destroyed by chemical or other agents, putrefaction is arrested; and another, that if a solution of animal matter, or of certain salts, be boiled in a flask, and the flask sealed, or its neck stuffed with cotton wool during ebullition, or previously bent, with its orifice looking downwards, or formed into contortions, with its orifice looking upwards, the solution does not putrefy. But should the flask be left unsealed, unstuffed, or should its neck be unbent, or the contorted portion broken off, or, according to Sanderson, should a drop of distilled water, a thread of silk, or a hair, be brought in contact with the fluid, or if it is prepared with ammonic tartrate, &c., and the flask immediately re-sealed, restuffed, or otherwise made as it was, decomposition of the contents soon takes place, because the germs of bacteria have thereby access, or are introduced into the fluid.

The other, or physico-chemical school, holds that bacteria are mere innocent concomitants of putrefaction and its result; that their *role* is the integration of organic particles into their own protoplasm, as these are breaking down into inorganic; hence they are constructive, not destructive. This seems to be obvious, from the fact that a bacterium must be more highly organized than a speck of decaying albumen, or a mixture of potassic and calcic phosphate with magnesic sulphate and ammonic tartrate.* The disciples of this school concede, in a majority of cases, that the arrestment of putrefaction is concident with the destruction of bacteria, etc., by chemicals, etc., but they argue, and I think rightly, that the organisms are not solely acted on—that the soil or pabulum on which they are thriving is affected as well—hence its decomposition may be arrested by some *modus operandi* not easily explained; so that the bacteria die, not only from the foreign body acting on them as a poison, but also from starvation. What arrests putrefaction in decaying matter (of course)

* Bacteria flourish exhuberantly in a solution of these salts.

prevents it in fresh matter, and *vice versa*. Hence the action of the arrestant is that of the preventive, and if that of the preventive, it follows that putrescent and putrescible soils are antisepted independently of any alleged toxic action on concomitant or aerial contiguous organisms.

The adherents of the physico-chemical school explain the absence of putrefaction in the boiled solutions in flasks by saying, that it is not prevented by destruction of contained bacteria or their supposed germs by boiling, and their subsequent exclusion by the stuffed, bent, or contorted neck of the flask (though they may or may not admit the possibility of their being in the circumstances both destroyed and excluded); but by the destruction or intercepting of minute portions of putrid matter, which, has Liebig as shown, communicates its peculiar condition by contact to substances susceptible of the same changes. It might be here asked, is it not possible by some contrivance, to prevent the appearance of bacteria in a solution of unboiled animal matter, and at the same time allow free access of air, as the result would show whether putrefaction would proceed without organisms? Yes, it is possible. If to a solution of blood serum of specific gravity about 1·6, about one-eighth to one-tenth its bulk of liquor potassæ be added, and the mixture freely exposed without previous boiling, putrefaction proceeds at an accelerated pace till expended—the latter being inferred from the mixture ceasing to respond to the tests for albumen. There is a complete absence of bacteria, hence of turbidity, and in a few days no bad odor. It is a well-known law that alkalies hasten the decomposition of organic matter. Now, in this experiment, as putrefaction proceeds, the fluid is too caustic to allow bacterial life, while the absence of bad odor is the result of the consentaneous oxidation of the fetid products with their evolution. But it may be argued that this experiment only proves that organisms are not the only cause of putrefaction (a concession which, as it seems to me, at once devests the germ theory of its exclusive nature); that if the reverse could be shown—viz., an animal fluid containing organisms, and yet not putrefying—that would be "proof positive." Now, while I cannot see my way to believe that bacteria and their allies are the cause of putrefaction, I am fully convinced they are its surest sign—that we may have putrefaction without bacteria, but never bacteria in a solution of animal matter without putrefaction. But although bacteria, etc., cannot exist in an animal fluid without putrefaction, they can be rapidly and

exuberantly grown in a solution of the salts already noticed, which are incapable of putrescent decay; and this, I think, renders the proof as convincing as needs be against the bacterial origin of the putrefaction; because, on the one hand, putrefaction may exist without bacteria, and on the other bacteria without putrefaction. Moreover, Dr. Bastian, whose elaborate investigations do honor to British experimental biology, has shown in an able paper read before the Royal Society,* "on the temperature at which bacteria, vibriones, and their supposed germs are killed," and on the causes of putrefaction and fermentation, "that certain more changeable fluids, *i.e.*, fluids rich in nitrogen, after boiling and when exposed to filtered air, or cut off from contact with air, do nevertheless putrefy, and therefore need neither living units nor dead organic particles to initiate those changes which lead to the evolution of living organisms." Briefly, Dr. Bastian has proven that putrefaction may arise *de novo*, and judging from the composition of certain organic bodies, there seems no *a priori* reason why it should not.

3d. THE PREVENTION OF PUTREFACTION.—This is done chiefly by cold, exclusion of air, desiccation, the application or admixture of certain foreign bodies, chiefly chemical. I shall confine my remarks to the latter.

There is one point of great prominence which constitutes a fundamental law in regard to the prevention of putrefaction, viz.: that bacteria and vibriones require for their proper development a neutral or alkaline medium and fungi an acid one. *Ergo* to prevent or arrest putrefaction, acidify considerably the bateric environment, and fermentation is produced, known by the absence of putrid odor, turbidity, and motile organisms, and the presence of torulæ and mycelial tufts, also by rapidity of decomposition. By adding more acid the fluid neither putrefies nor ferments. The converse also partly obtains by the moderate addition of potash to a fermenting solution, fermescence is arrested and putrescence induced, but if added in excess the latter is greatly accelerated, as already stated, *minus* its usual physical phenomena. The action of acids and alkalies on a solution of animal matter may be summed up thus—acids added in small proportion to a fresh solution cause it to ferment and prevent it putrefying. Added in large proportion they prevent both putrefaction and fermentation. Added in small proportion to a putrid solution, putrescence is arrested and fermescence induced. Added in

* Proc. Royal Society, No. 145, 1873.

large proportion to a fermenting or putrid solution, both processes cease indefinitely.

Alkalies added in small proportion to a fresh solution hasten its putrefaction and prevent fermentation. Added in large proportion they prevent fermentation and quicken putrefaction, *minus* its usual sensible properties. Added in small proportion to a fermenting solution, fermescence is arrested and outrefaction induced. Potash added in small proportion to a putrid solution exacerbates putrescence. Added in excess, putrefaction is soon expended.

From the foregoing remarks it will be seen that, where circumstances admit, we have it in our power to induce fermentation at will, should that be deemed preferable to putrefaction, or to prevent both. But it may be urged, may not a fermenting fluid be as objectionable as a putrefying one? I think not. Putrescent matter, evolving nauseating effluvia for nearly twelve months, must be more hurtful than fermenting matter almost odorless, and being fully decomposed in about three months, while the torulæ found in this fermentation are identical with those swallowed alive by the million by beer drinkers, and the other fungi with those present in butter-milk, cheese, fruits, etc., which are also swallowed with impunity.*

I now come to the second division of the subject, and proceed to consider:

1st. THE NATURE OF CONTAGIA.—So little is known of the essential toxic principle of contagia that this part must be treated briefly. As with putrefaction, we have here also two shades of opinion, one is that contagia are of the nature of fungi, or allied to baceteria, perhaps baceteria themselves. Sanderson is of opinion that the latter may constitute communicable poison, or are probably the carriers of it. The other opinion is that contagia consists of minute particles of albumenoid matter in an unknown state of synthesis. Thus the same origin is assigned to zymotic disease as to putrefaction; while, to complete the analogy, as Dr. Bastian showed that the puterfaction may arise *de novo*, Dr. Richardson and others hold that contagia may be spontaneously evolved.

*At this point of the paper, thirty-six tubes were shown, containing uniform portions of a solution of blood serum, and of a chemical substance. The mixtures had been in the tubes for fourteen months, and presented a varied appearance to the naked eye. The tube with benzoic acid was conspicuous from its being the only one free from haze and sediment. Its contents were as fresh and clear as on the day when the tube was filled. This substance is certainly a powerful antiseptic. See "Putrefiers and Antiseptics," *Glasgow Medical Journal*, Nov., 1872, and Feb., 1873.

These two opinions, however, are still *sub judice*, but it seems to me the physico-chemical theory is nearer the truth than the vital theory, being more in accordance with the few well-ascertained facts. These refer chiefly to the morphology, etc., of vaccinine and varioline, nothing definite being known of the physical aspect of the other zymotica. Dr. Klein, of the Brown Institution, London, is at present investigating the minute pathology of enteric fever, and possibly, when his labors are completed, some new facts may be disclosed. As to vaccinine and varioline, these are colorless, lymphy albumens, alkaline in reaction, coagulable by heat, precipitated by certain acid bodies, and odorless. Dr. Braidwood, of Birkenhead, in an interesting paper, "The Morphology of Vaccine Lymph," concludes "that the latter presents three very distinct species in human variola, variola vaccinæ, and in variola equinia. That the virus of variola ovina may be allied to those, but this has not yet been determined. That an attack of one of these by inoculation or contagion protects against the other two members of the species. That this protective quality distinguishes this type of virus from that of other epidemic fevers. That vaccine virus is unaffected by, and does not affect other febrile viruses. That the syphilitic virus more closely resembles the vaccine than do other febrile viruses, being inoculable and almost always affording protection against a second attack; but it differs from variolic viruses in not being contagious (infectious) under any circumstances, and being incapable of inoculation into the lower animals. That the several febrile viruses differ from one another, and operate on separate elements of the blood."

Dr. W. B. Richardson, ten years ago, produced pyæmic poison salts from the serous fluids of a pyæmic patent, by the addition of hydrochloric and sulphuric acids. These he termed hydrochlorate and sulphate of septine. From this it was inferred that the base was of an alkaloidal character. In the present year he found that all septinous poisons liberate oxygen from peroxide of hydrogen, with evolution of heat, from which he concludes that the septinous product acts upon the blood in the extreme circulation, when it has accumulated in sufficient quantity, by liberating a portion of oxygen, and hence creating a febrile temperature.

A portion of variolic or vaccine lymph placed under a microscope is seen to consist of a mixture of *granules* about $\frac{1}{20000}$ of an inch in diameter, and certain corpuscles not unlike those of pus, termed *leucocytes*, suspended in the lymph plasma.

Chauveau found that leucocytes and plasma, *per se* or separately, had no power of infection, while the smallest portion of the granules which could be used caused their characteristic disease. He, however, discovered latterly that the leucocytes were the receptacles of the granules, the latter growing in the former like seeds in capsule, as granules set free by rupturing leucocytes were found to infect.

2d. THE ORIGIN OF CONTAGIA.—This is a subject I shall merely touch, but which is deserving of far greater attention than it has hitherto received, and which must be thoroughly investigated if epidemic disease is to be checked or extinguished. While admitting in the fullest sense the communicable nature of zymotic poisons, I am of opinion that they have all arisen, may all arise, and some at present do arise, *de novo*. It seems to me futile to argue against the spontaneous origin of any single zymotic malady, small-pox for instance, by saying it may always be traced to a previous case, for this reason, that the conditions under which it was generated may have ceased to exist, while those under which it disseminates still prevail. A contagium evolving spontaneously, say amidst festering accumulations of nitrogenous *debris* (the undoubted primary source of all contagia), may subsequently require, and in most cases does require, nothing more for its propagation than some peculiar condition of the body, indicating a little, if any, lowering of the health standard, and thus it may perpetuate itself after its natal conditions are extinct. In other words, some infectious viruses seem to exist in media less inimical to health than are required for their generation *de novo*. Hence zymotic explosions indicate malhygienic conditions unusually favorable for the multiplication of existing contagia, and should these conditions obtain to a higher degree in quality, time, and space, not only may existing virus be largely and rapidly reproduced, but fresh quantities spontaneously evolved. Furthermore, there are facts showing that storms of contagia, such as those of plague, relapsing fever, etc., may arise *de novo* under certain abnormal conditions of the body and surrounding media, scatter the poison profusely around with sudden alacrity, and when these conditions are removed, cease, being unable to exist unless in a comparatively exceptional nidus. Well might Dr. Richardson ask where are the germs of the plague, sweating sickness and black death? Has improved sanitation anything to do with their absence? To which I might add, would a return to the conditions then existing, with a London death rate of about 50 per thousand, not again conjure to life

the deadly viruses of the fearful pestilences? And, moreover, would further improved sanitation not diminish the mortality of all, nay, even check the evolution of some existing zymotic distempers, so as also to render them matters of history?

The last division for consideration here is—

3d. THE DESTRUCTION OF CONTAGIA.—This point is necessarily of a very abstract character. For although contagia make their presence felt widely and conclusively, and though their specificity seems varied and definite, yet, as already stated, almost none have been isolated. I am compelled, therefore, to confine my remarks on this point to the destruction of the infecting power of vaccine lymph, the only virus with which it is safe to experiment on the human subject. The results of these experiments can, therefore, only be applied inferentially to the other hypothetical febrile viruses. I shall first notice what does, and secondly what does not destroy the infecting power of vaccine lymph.

Dr. Henry, of Manchester, showed in 1831, that dry vaccine lymph, heated for two hours to 140° Fahrenheit, failed to produce vaccinia. I myself made the following experiments: Separate portions of vaccine lymph were exposed for twenty-four hours, under identical conditions, to various volatile media. They were then liquified by neutral glycerine, the reaction of the mixtures ascertained and sealed in tubes till children were vaccinated with them. The results showed that with the mixtures of lymph and glycerine which were neutral or alkaline, vaccination was successful, while with those that were acid it was unsuccessful.* These experiments were repeated with the acid bodies only, but the acidized lymph, instead of being sealed in tubes, was exposed to the air for about twelve days, in order to see whether the infecting power of the lymph was merely suspended. The results, however, was the same as when the lymph was at once sealed in tubes. The volatile bodies which destroyed the infecting power of the lymph were sulphurous, nitrous, glacial acetic, and hydrochloric acids, and the vapor of chloride of lime.

Two tubes of vaccine lymph were mixed with half a minim of liquor potassæ. Twenty-four hours after, the mixture, now dried into a film, was moistened with water, and a child vaccinated with it. The operation was *unsuccessful.* Two tubes of lymph were mixed with one minum of a mixture consisting of one part of liquor potassæ in twenty of water.

* Glasgow Medical Journal, loc. cit.

One day after, the residual film was moistened with water, and a child successfully vaccinated with it.

This experiment was repeated, but the mixture, instead of being used to vaccinate one day after its preparation, was laid aside for ten days, in order to see whether more prolonged contact of potash and lymph would annul the latter's infecting powers, in accordance with the law that alkalies hasten the oxidation of organic matter. The remaining film was moistened with water, and a child vaccinated with it. The operation was unsuccessful.

I shall now consider what does not destroy the infecting power of vaccine lymph. Melsens, in the *Journal de Pharmacie et de Chemie*, 1870, shows that vaccine lymph retains its activity when exposed to the intense cold of —80° centigrade. In my own experiments alluded to, I found that the concentrated vapors of carbolic acid, chloroform, camphor, ether, and iodine, had no impression on lymph. This result was more expressive with carbolic acid, as through an inadvertency it was allowed to act on its lymph twelve hours longer than were the other bodies on theirs. As this was confirmatory of previous effects obtained from carbolic acid, I resolved to investigate the matter further, more especially as Lemaire states he found that vaccine mixed with carbolic acid failed to vaccinate. Also, that in infants, when immediately after vaccination the puncture was touched with carbolic acid, no vaccinal vesicle resulted. Crookes also says that a trace of carbolic acid annuls the infecting power of vaccine lymph. Besides, as you are aware, this body has been extolled as the *ne plus ultra* of antizymotics.

I accordingly made the following amongst other experiments:

(1) A tube of vaccine lymph was mixed with one minim of a one in fifty aqueous solution of carbolic acid, exposed to common air for ten days. The resulting film was then moistened with water, reaction neutral, and a child successfully vaccinated with it.

(2) A tube of vaccine lymph was mixed with two minims of a one in twenty aqueous solution of carbolic acid, equal to one-fifth grain of pure acid. The mixture was bulky from coagulation of the lymph, and was at once sealed in tubes. Five days after a child was vaccinated with it. The operation was unsuccessful.

(3) The second experiment was repeated, but the mixture of lymph and acid, instead of being immediately sealed in

tubes, were exposed on a slip of glass for fourteen days, and a child successfully vaccinated with it.

(4) The third experiment was repeated excepting that the carbolized lymph was exposed only twelve days. Vaccination was again successful. These experiments were carbolic acid and vaccine lymph prove—that the infecting property of the lymph is unaffected after being buried for thirty-six hours in an atmosphere of concentrated carbolic vapor. That even where vaccine is incorporated with what is manifestly a large quantity of carbolic acid (nearly equal parts), its infecting property may be but suspended, and that only when the mixture is hermetically sealed from the atmosphere. That if such a mixture be exposed to common air for twelve days, its lymph is normally active. The negative results obtained by Lemaire and Crookes, and in my second experiment, are explained by the mixture having been used to vaccinate soon after its preparation, when probably the coagulation of the lymph prevented its absorption by the dermal capillaries. Whereas when the acid is allowed to votalize for twelve days, the lymph is rendered more soluble in water, and being still unimpaired by its recent union with the carbolic acid, vaccinates successfully, as stated. Now, when vaccine is thus so obviously unaltered by carbolic acid, and remembering that vaccinine is inimical to varioline, it seems a just conclusion, if we are to be allowed to reason at all, that, at least, to a similar degree, will varioline be unaltered by carbolic acid; and if so, I submit there is a strong presumption that all zymotic poisons will, under the same circumstances, remain active, and not only so, but that carbolic acid rather antiseptes, rather preserves, than destroys their zymotic powers; moreover, it will be conceded that the conditions of the experiments were highly in favor of carbolic acid, the proportion of that substance present being greatly in excess of the quantity which it is possible to use in practical excremental or aerial disinfection. Briefly, the experiments show that the use of pure antiseptics as antizymotics is a palpable paradox, preservation being practiced and destruction expected.

Furthermore, as vaccine is made inert by the acid vapors adverted to, it seems a logical inference that so will varioline, because, as vaccinia prevents variola, so that which annuls the virile power of vaccinine, must of necessity annul the virile of varioline. Therefore, I hold it would be justifiable in practice to extend these inferences, so as to include all infecta and contagia.

The last experiment with vaccinine and potash shows that the infecting property of lymph may be quickly destroyed by mixture with an excess of potash.

The second proves that a moderate quantity of potash mixed with lymph does not soon annul its infecting powers.

The third shows that if the conditions of the second are prolonged for ten days, the lymph is made non-infective. From these results, it may be justly concluded, that variolous and other zymotic poisons would, in the same circumstances, be affected similarly to the lymph, also that the other alkalies would act on lymph similarly to the potash, and in like manner on the other zymotica.—*Glasgow Med. Jour.* July, 1875.

THE ALIMENTATION OF INFANTS.

A paper read by Dr. Dawson at one of the New York Medical Societies (*New York Med. Record*, June 5), contains some very useful remarks upon this important subject. He commenced by exhibiting the intestinal canal taken from a child seven months old, in a state of extreme softening, induced by gastro-intestinal irritation, which had been going on for four months. After alluding to the fact that a fourth of the children born die before they attain their fifth year, he stated his conviction that *faulty alimentation is the great cause which induces the gastro-intestinal irritation which carries off the bulk of them.* The composition of the mother's milk, as well as the condition of the digestive apparatus, show how well these are adapted for each other; for, at first there is no secretion from the glands capable of digesting the starchy elements of food, while the size of the liver, and the size and shape of the intestinal tube, show that food is only to be retained for a short time, and, therefore, should be of quick and easy digestion;—also showing that *fluid*, not solid, animal, nor vegetable, food is that which is suitable for the infant. If these indications be neglected, food is very liable to give rise to vomiting, gastro-intestinal catarrh, and other disorders which ultimately prove fatal.

It is, perhaps, difficult to decide on the quantity of milk proper for an infant; but, at all events, the child should not be induced to take more than sufficient to satisfy its appetite, after which it should at once be removed from the breast. Simple as this rule is, it is constantly neglected, every cry of the child being thought to denote hunger, and to call for a

fresh supply. Too large quantity, and too frequent repetition, should, however, be carefully avoided, for over-distention of the stomach is almost as bad as giving indigestible food. A positive proof of such over-feeding is the eructation of the milk soon after suckling; although this, in some rare instances, may be due to some fault in the milk. Chronic vomiting and gastro-intestinal disorders can very commonly be traced to this over-suckling, or to too great frequency of suckling. Upon this last point there is much difference of opinion, although it is generally thought sufficient to give the infant the breast every two or three hours during the day, and once or twice during the night—the milk being extremely liable to cause colic, diarrhœa, etc., when given oftener in the night. When called to a case in which, owing to over-feeding, vomiting and intestinal disturbance have been going on for some time, giving rise to emaciation, etc., the urgent indication is to give the stomach rest. All medicine and alimentation should be stopped when the case is urgent, giving, perhaps, a teaspoonful of cold water every fifteen or twenty minutes. The stomach in this way should have absolute rest for twenty-four hours, and, when nursing is resumed, the child should suck only a few mouthfuls at moderate intervals during the next eight or ten days, when it will very frequently be found that the normal quantity of food can be taken without trouble. Constipation, as well as diarrhœa, is very often due to over-suckling or too frequent nursing. The stomach is over-taxed, and the food, instead of being finely coagulated, comes into contact with old coagula, and the coagula then formed are large and hard, and, if not thrown up by the stomach, pass into the intestinal canal little or not at all changed; and there, as hard, dry masses, give rise to constipation. It is an accumulation of such curds that sometimes gives rise to intestinal catarrh, which may finally terminate in severer forms of intestinal disease, and is probably one of the frequent causes of cholera infantum. Abnormal acidity of the stomach may sometimes be the cause of the formation of these abundant coagula, but that is exceptional.

If an *artificial diet* be judiciously selected, there is no reason why a child should not thrive as well upon it as upon the breast; but to this end it must consist of a liquid food possessed of heat, and fat-producing properties. Cows' milk should in general be preferred to that of other animals, and, when properly prepared, may answer all purposes. To this end it must be diluted, and for this purpose water is usually

employed. But in far the greater number of cases mischief results from this, for the addition of water does not improve the digestibility of casein, inasmuch as it does not dilute it; and when milk so treated is taken into the stomach, the water is soon taken up, leaving the casein unchanged. Nor does the addition of sugar make the coagula easier of digestion, while skimming the milk deprives it of one of its most important constituents. Inasmuch as the mother's milk contains proportionally more fat than other milks, it may be that the finer coagula produced by it are due to the presence of this fat, and it would be better to use other milk from which casein had been removed than that which had been deprived of its cream. The admixture of farinaceous-substances also leads to disastrous results. Barley-water, however, is an article that contains so small a quantity of starch that it may be advantageously employed for dilution—good cows' milk diluted with from one-third to one-half of barley-water forming one of the best articles of food that can be used for infants when it is necessary to bring them up artificially. When it cannot be procured, oatmeal may be substituted with advantage. By these a real dilution of the casein is produced, rendering the coagula much finer and more nearly like those produced in human milk.

In the discussion which followed, Dr. Joel Foster expressed his belief that almost as much mischief is done by over-feeding as by under-feeding infants. Attached to the New York Infant Asylum, he has found it necessary to use a substitute for breast-milk, owing to the difficulty of getting a supply of this. For this purpose he employs cows' milk, which he allows to stand until the cream begins to rise, then taking the upper portion and diluting it with barley-water. He is very particular in giving it at regular intervals, and at a temperature near that of the body; for, when given below this, it may readily produce gastro-intestinal disturbances. It has been found that milk taken directly from the cow does not do for children nearly so well as when allowed to stand for about two hours, when a partial separation of the cream has taken place, and then taking the upper portion of the milk. In this way more fat and less casein is obtained. Dr. Messenger urged the propriety of thoroughly cooking whatever article is used for diluting the milk, and he always insists that the barley-water should be boiled for three or four hours. Dr. Lewis Smith remarked, with reference to the use of farinaceous food, that up to the third month the salivary glands and pancreas

are present only in a rudimentary state, and consequently that the fluid suited for the digestion of starchy matters is absent; but it is also probably true that starch is not so irritating as is the undigested casein. He has been accustomed to employ the upper portion of the milk, after it has stood for a short time; and he prefers to use as a diluent some article that has been changed into dextrine or glucose, and recommends Liebig's food. He does not think that sugar should be added in warm weather when diarrhœa is present; but if there is constipation, he gives it in the form of sugar of milk, which is the best. He is decidedly of opinion that many deaths occur among children from the fact that mothers regard numerous stools as necessary while the child is teething. Dr. Robinson suggested that the weight of the child might determine whether it is receiving sufficient food or not.—*Med. Times & Gaz.*

Putting Things in their Place.—"The place of a comet," says a writer on domestic topics, "may be accurately calculated after certain perturbing influences have acted upon it, but the locality of a bootjack, when that humble article is wanted, is seldom exactly computed by the masculine brain." The same remark could too often be applied with equal truth to coats, hats, dressing-gowns, slippers, gloves, and articles innumerable in daily use. It would be quite as difficult for the orderly housewife to compute an eclipse as to reckon up the time she spends from one year's end to another in hunting up articles that are out of place, and in putting in place things "lying round." One of the benefits that the mother of sons can confer on her own sex and on all the world beside, is to form in them the habit of putting things in place.—*Tribune.*

Average of Life.—A return recently made by the Registrar-General, in compliance with an order of the House of Lords, shows the average age at death among different classes in the healthy county of Rutland on the one hand, and on the other hand in the Superintendent-Registrar's district of Liverpool, of Manchester, and of Salford, all of which three have a high death-rate. The classes distinguished in the return are (1) the gentry and professional persons and their families; (2) tradesmen, etc., and their families; and (3) laborers, mechanics, and servants, and their families. The return extends over the thirteen years, 1861-'73. The deaths in that period in the first class, among the gentry, occurred at ages which gave an average of 48·1 years in Rutland, but

only 46·1 in Salford, 44·6 in Manchester, and 45·6 in Liverpool. The difference is not very great; but in the second class—the tradesman class—the ages at death in Rutland show an average of 44·4 years, but only 29·6 in Liverpool, 28·9 in Manchester, and 29·7 in Salford. Among the third class, laborers, etc., the ages at death averaged thirty-six in Rutland, but only 23·4 in Liverpool, 24·4 in Manchester, and 22·4 in Salford. Another part of the return shows how many of the deaths were of children, how many of the young persons, and how many of adults; and here we see how, in the three towns, the excessive loss of life in infancy brings down the average age at death. Taking 1873, the last year in the series, we find that in the towns no less than 8,394 of the 19,117 deaths—that is, nearly 44 per cent—were of children under five years of age; but in the county of Rutland only 129 of the 417 deaths, or less than 31 per cent. In the towns more than 21 per cent. of the deaths were from zymotic diseases, but in Rutland less than half that ratio; and in the towns nearly 74 per cent. of the deaths from zymotic diseases were of children under five, but in Rutland only 55 per cent.—*Sanitary Record*, July 3, 1875.

Dr. Bernays (contribution to the subject of cremation, St. Thomas' Hospital Reports), proposes to burn the soil rather than burn the dead, and considers that a heavy clay soil would be admirably suited to compass a harmless decay, when once it has been rendered prematurely porous by burning. In this condition he considers its power of absorption of gases is very great; and this power is nearly equalled by its property of slowly burning the gases. He would, therefore, swathe the body in a well-bleached fabric, and lay it in a coffin of perforated iron plate, covered with a lid of the same material, interring within forty-eight hours at the very outside. The coffin would be lowered into a grave the bottom of which would be covered with twelve inches of charcoal; and the grave itself, one foot wider than the coffin, would be filled in with burnt ballast to a depth of six feet from the surface, the superficies being afterwards planted. He recommends coffins of perforated plate because they would be strong enough to support the earth until oxidation had resolved the coffin as well as the body. Moreover, the ferric hydrate would, he believes, aid disinfection.—*San. Rec.*

The sewage difficulty in the large towns of the United States is apparently becoming urgent. The drainage of a

large city like New York cannot be poured with impunity even into an estuary almost filled with sea water. Looking forward to the probable increase of the city and the certain increase of the nuisance from sewage, it is now proposed to intercept the whole contents of the drains and carry them out to the sandy grounds of Navesink, where they will be filtered and made to produce, possibly, a good proportion of the animal consumption of vegetables. A company undertakes to do all this gratis, provided only that the privilege to make use of the sewage shall be given to it in perpetuity.—*Ex.*

Experiments on the Prevention of Contagion.—Dr. Froschauer obtained ten healthy lambs from a region perfectly untainted by disease. These lambs he vaccinated with sheep-pox lymph. Four of these ten lambs (who were kept in an ordinary stable) died in from sixteen to twenty-two days, with all the appearance of small pox. The other six he kept in an atmosphere containing sulphureted hydrogen 1-4000. Except one lamb, which was slightly six, all remained perfectly healthy, even in the places where the virus was introduced.

This immunity from pox in the lambs, the author thinks, is due to the sulphureted hydrogen. Like vaccine, other less injurious substances can protect against severer ones.

The author also subjected rabbits to an atmosphere containing sulph. hydrogen and then injected subcutaneously a dose (sufficient to kill) of cyanide of potassium; the rabbits lived, and the author concludes that the preparatory treatment caused the immunity from the deadly dose of potassium cyanide.

As it is impossible to follow and destroy contagion, the author lays special stress on the necessity of producing an immunity from disease (cholera, etc.). This immunity can be produced, as he thinks, by a relatively small quantity of sulphureted hydrogen.—*Translated from the Germ. in Detroit Review.*

How to Live Long.—To live long is to live well, by eating and drinking abundantly all the good things of this life, in their season, in their freshness, in their perfection; not only the fruits of the orchard, the vegetables of the garden, and the grains of the field, but of the birds of the air, the fish of the sea, and the cattle upon a thousand hills; by gathering around us the comforts and conveniences and luxuries of life; by cultivating the higher tastes of our nature; by cherishing the affections, and by the promotion of all that innocently enlivens, exhilarates, delights and enraptures.—*Hall's Journal.*

THE SANITARY JOURNAL,

DEVOTED TO PUBLIC HEALTH.

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THE MEDICAL ACT AND THE PUBLIC—WHO IS PROTECTED?

There are those who would persuade the public that the present Medical Act was passed solely for the protection of the medical profession; that its only effect is to give a medical monopoly; that it is an injustice towards some one, we hardly know whom, a few knaves who would obtain an easy livelihood by gulling a credulous public; that in fact the public does not need protection. It has been discovered that one medical man has said that no one outside of the profession is interested in the suppression of quackery, and apparently mistaking his meaning—for even this *one* did *not* say that only the "doctors are *benefitted* by it"—much is made of it by a leading organ which ought to know better than to uphold as it has ever done those who practice that illegitimate art. So far as we know, the profession has never desired or asked for protection, further than that derived in common with that entire public which ever naturally desires to be shielded as far as possible from knavery and imposition. On the other hand, among medical men, in medical meetings and in private medical circles, it is very generally believed and asserted that, upon the whole, quackery brings grists to the regular medical mill. The profession, in attempting to shield the masses from the effects of quackism, no doubt places itself in a position in which suspicious, distrustful people would naturally attribute selfish motives. But are the motives selfish which prompt hundreds and thousands of the most enlightened phy-

sicians of the age to take so deep an interest as they now do in the matter of Public Health, in Preventive Medicine? Were the motives selfish which induced the Medical Council at its last meeting to pass a resolution urging upon the Government the advisability of some legislation by means of which disease might be largely prevented, by means of which people might be forced to use means to preserve the public health? We leave these questions for those to answer who uphold the Charlatan and Empiric. Said Dr. Lyon Playfair recently, on the occasion of a public ceremony in King's College, London, "Can there be an example of more unselfish labor than the effort of a medical man to extirpate disease, on the existence of which his daily bread depends?"

The *Globe*, it appears, would grant a free licence to practice the healing art to any one and every one possessed of sufficient "cheek" and dishonesty to "pick up" the art and use it as a means of gulling his fellow-creatures. It would admit the most ignorant pretender to the bed-side to act the part of physician to an almost dying man, in whom the thread of life might be broken by the most trifling error—as by giving or withholding a medicine; it would admit the ignorant pretender, or the equally ignorant though sympathizing friend, as physician to the bed-side of the parturient woman, where two lives might hang upon a thread, which ignorance might snap, but which knowledge might preserve unbroken. Once, and thank God only once, it was our lot to be an eye-witness to the horrifying results of nescience on occasion like this. There was the widowed, horror-striken husband and father, the half dozen, five or six motherless children, and the bodies of the mother and infant yet warm but dead, after suffering for thirty odd hours pangs worse perhaps than death, through the ignorance and obstinacy of an "experienced" midwife, who had not, however, sufficient knowledge to enable her to judge when more skilful aid was needed, until too late. Here, with the exercise of moderate knowledge all would in all probability have been well.

Medical men are the guardians of the public health and of life,

and it is the bounden duty of every one of them, of the profession *as a unit*, to strive to their utmost to suppress this trifling with human health and human life, whatever may be the motives attributed to them; it is their duty to "insist," as the *Globe* complains that the profession does, "on a particular educational course being a condition precedent to practicing;" and to "hold that nobody can be a qualified practitioner without it," without, in short, giving evidence of possessing the highest *obtainable* knowledge connected with the science. And, moreover, we firmly believe the Legislature will sustain the profession in its efforts to suppress an evil, not only "for the moment," but for all time to come.

We do not say the science of medicine is by any means perfect. But if there are the difficulties in the practice, in diagnosing, in understanding the effects of medicines, etc., etc. which the *Globe* was pleased to find one of its correspondents recently admitting, it is one very good reason why the utterly ignorant should not be allowed to practice. And, we may be permitted to say, by the way, that it is also a good reason why medical men should give their attention still more to preventive medicine, which is a better understood branch of the profession than is the curative. "No one," says the *Globe*, "will deny the *great advantage* of studies, well directed, to the medical practitioner." From this admission, can not the answer to the whole of its arguments be placed in a nut-shell? Why then shall not the public receive the *full benefit* of "the great advantage" thus obtained? It is idle to argue that the public may or may not, as it sees fit, but it shall not be obliged to, benefit by the advantage conferred by the education. A large portion of it is not capable of judging in such a matter, though they may be sufficiently competent judges of "shoemaking" or "hair-cutting," which have nothing whatever to do with the matter of health and life. Why have inspectors of weights and measures? Why condemn light bread and adulterated food? Why, as they do in some cities, have milk inspectors? Why but to protect the people from being imposed upon when they cannot see and judge for themselves?

Recently at an inquest in England, upon a child which had died through criminal neglect, the jury added to their verdict that their opinion was that the law ought to compel persons to obtain medical advice for their children when ill.

As regards the best manner of protecting the public from quackery, we have nothing to say. Let there be the best possible protection. The present law may be improved from time to time as seems best. But all the arguments of the *Globe* against the principle of protection remind one of those used in school-boy debating clubs; ingenious enough, but wanting in that weight and force which a belief in the truth of the argument gives—used for the sake of argument. In fact it is difficult to believe that the writer of the articles himself believes in the truth of what he is writing. Truly the "way" of the organ is as "the way of a ship in the midst of the sea," had it existed in the time of Solomon it would have been one of those things which were "too wonderful" for him.

MILK; DARKNESS AND SILLSLOPS.

The time is drawing near when milch cows cannot graze in the open fields, but will require to be sheltered and fed—upon what? It is a well-known fact that milk is readily affected by the nature of the food consumed by the animals yielding the milk; every one knows how common it is for milk to be flavored with substances used as food. Dr. H. B. Baker (Sec. State Bd. of Health, Mich.) says, (last annual report), "If milch cows eat grain or hay affected with smut, or drink it in water, it seems quite probable that the milk will contain at least a portion of the poisonous principle." And again, "Act No. 26, laws of Mich., 1873, very properly forbids the sale of milk from cows *fed on refuse from distilleries or breweries*; for the very good reason that such milk has been proved to be injurious to persons using it." As to using milk from unhealthy or diseased cows, one need hardly mention it; no one would *knowingly* use it. A late number

of the London *Lancet* says a good deal of sickness prevailed among children in Tipperary, supposed to arise from the deleterious effects of drinking milk from the cows affected with foot-and-mouth disease.

Cows milk very frequently constitutes the principle article of diet of children at a period of life when good, wholesome food is absolutely essential to perfect development; it is also the chief diet in many forms of disease, and life may frequently depend upon its quality. How very important it is then to see that this food is always of the best quality. Milch cows are not unfrequently kept in dark, badly ventilated stables, and fed upon improper food, in which circumstances it is impossible for them to be in a healthy condition. Happy infants of Toronto who were unable to read in the *Globe* last spring the brief history given therein of the source of a large portion of their nutriment—of some of the city dairies, as visited by the city commissioner and a reporter. True, it was said the stables appeared to be clean; but cleanliness and darkness and confined air do not usually dwell together. Think of milk manufactured from still-slops in a dark, close stable!

Many cities in Great Britain and the United States have their milk inspector, and we observe that milk vendors are fined from time to time for selling a sophisticated article. A number of outbreaks of typhoid fever have been traced unmistakably to the milk supply, in which for the most part the contagion appeared to find its way into the milk from foul water, used, of course, *only to wash the pans, etc.* Is it not time that in Canadian cities and towns the proper authorities were attending to this matter, and adopting means not only to prevent the sale of an adulterated or even a *diluted* article, but to enforce the proper housing and feeding of milch cows? It is the people's duty and privilege to demand this. Delays are dangerous.

Two Cases of Fatal Poisoning, a mother and daughter from eating fungi, which they supposed to be mushrooms, are noticed in a late number of the *Medical Times and Gazette.*

On the Prevention and treatment of scarlatina and other infectious diseases, D. J. Brakenridge, M.D., F.R.C.P., of the Royal Infirmary, sends a communication to a late number of the *Medical Times and Gazette*. He asks, can any disinfecting influence be brought to bear upon disease—germs within the body? Prof. Polli, of Milan, and Dr. Sansom, found that by administering to animals, as guinea-pigs, for a few days, the sulphates of the alkalies and sodium sulpho-carbolate, no ill effects were produced, but the flesh, when the animals were killed, "showed a marked tendency to resist putrefaction," though that of animals killed under ordinary circumstances rapidly putrefied. Dr. Brakenridge naturally thinks that if we can so disinfect the tissues of living animals, there is no reason why we should not hope to be able to arrest or prevent a zymotic disease. He has been in the habit of giving the sodium sulpho-carbolate *to all individuals exposed to the infection (of scarlatina) who were not protected by a previous attack.* It was found the disease in many cases did not spread but was confined to those who first took it. He says it was given in 7 families to 22 individuals exposed to scarlet-fever; in 3 families to 15 exposed to diphtheria; and in 3 families to 8 persons exposed to measles. And the diseases did "not in a single instance extend beyond the individuals first affected." As to the curative effects of this sulpho-carbolate, we may observe, after Dr. B., had observed a succession of rapidly fatal cases of scarlet-fever, he determined to test fairly the administration of disinfectants. He gave the above salt freely; from 20 to 30 grains every two hours, to adults. "The odor of carbolic acid could be readily detected in the breath" of the patients. He has treated upward of 60 cases in this way in seven months without one death.

In London during the second week in August 1,483 deaths were registered; 1 from small-pox; 36 from measles; 87 from scarlet fever; 7 from diphtheria; 50 from whooping-cough; 22 from different forms of fever; and 147 from diarrhœa. Violence caused 56 deaths, 10 of which were from drowning.

DR. CHARLES KELLY, Medical Officer of Health for West Sussex, has issued his first annual report, which, says the *Lancet*, in many ways commends itself to the favorable consideration of sanitarians. In a brief chapter the author tells us that "the best disinfectants are the ancient elements—earth, air, fire and water," and explains the reason why.

A LAUDABLE ATTEMPT has been made in London, England, by the Church of England Temperance Society, to provide a counter-attraction to the public-house, by establishing in the poor districts, street-stalls for the supply of temperance drinks, and light refreshments, suited for the varying seasons.

FLIES AND CONTAGION.—An exchange draws attention to a vehicle of contagion not very generally recognized, viz:—the common house flies; and says it is highly probable that the communication of septic poison by their agency is not by any means rare. Though acknowledged scavengers, flies may no doubt in virtue of that very function be sources of danger.

PROFITS OF SEWAGE FARMING.—Some one has recently written a letter to the London *Times* giving a list of twenty-five sewage farms with their profits and losses. Only two of the twenty-five show a profit. Other writers deny the correctness of the figures, and also state that sums were charged to current expenses which should have been charged to capital account. However this may be, towns must get rid of the sewage, and it might be better for them to make good any deficiency in this respect. Before Parliament prorogued, Lord Rosebery moved for returns to show the profit and loss in all the different forms now practiced in the treatment of sewage. When these are published we shall have valuable information in this matter.

EFFECTS OF SANITARY MEASURES.—The Tottenham (Eng.) Sanitary Association, a two-years-old body of sanitarians, established to "watch over the sanitary interests of the parish, and to diffuse information on all matters connected therewith," has published a statement of the death rate in Tottenham from 1838 to 1874. This shows that notwith-

standing the increase of population between 1850 and 1860, the health of the place improved under the vigorous measures adopted by the *then* new Board of Health; that the salubrity of the place diminished as the population was allowed to outrun the sanitary arrangements; that recently, however, again, the ventilation of existing sewers, the construction of new ones, the purification of ditches and streams, and the exclusion of land-spring water from the water-supply, have produced an immediate diminution in the death rate, and a marked decrease in the mortality from zymotic disease.

A CASE OF LEAD-POISONING, the result of using *flake-white* as a cosmetic, has been communicated to the *Medical Times and Gazette*, Aug. 28, by Dr. Johnson, F.R.S., of King's College Hospital. The patient was a young married woman who acted as a ballot-dancer. The symptoms were well-marked; muscles of the forearms and thumbs much wasted, inability of extension, complete wrist drop, and blue line at the gums. Upon analysis the flake-white was found to consist chiefly of white lead, which, says Dr. Johnson, when applied to the skin of the face was partly absorbed through the skin, while some was inhaled through the mouth and nostrils; thus entering the blood. The patient stated that a friend of hers, also a ballot-dancer, was suffering from the same symptoms. Ladies who will use cosmetics should enquire into the composition of them.

THE LITTLE FOLKS should now have their legs and ankles well protected from the cold. The extremities require at least as much clothing as the trunk or 'body.' The originator of the fashion to almost bare the legs of children in cold weather has much to answer for, and the followers of it have but little less. If children must be compelled to wear fine thin stockings without outer covering, they might at least have a pair of thick wollen ones drawn on first, under the thin ones.

ERRATUM.--In the September number of this journal, on page 285 in the item "A Sanitary Question," Preventing Medicine is absurdly printed instead of Preventive Medicine.

THE DANGER OF SEDATIVES IN CHILDREN.—The *Popular Science Monthly* gives warning on the important matter of using sedatives for the little ones. "One of the great dangers attending the use of the various sedatives employed in the nursery is that they tend to produce the opium habit. These quack medicines owe their soothing and quieting effects to the action of opium, and the infant is by them given a morbid appetite for narcotic stimulants. The offering for sale of such nostrums should be prohibited, as tending to the physical and moral deterioration of the race. In India mothers give their infants sugar-pills containing opium, and the result is a languid, sensual race of hopeless debauchees." In Canada the poison is given in other forms. What of the consequences?

TEA DRUNKARDS.—Dr. Arlidge, pottery inspector, Staffordshire, protests against a very pernicious custom, which rarely receives sufficient attention either from the medical profession, or from the public. He says women of the working classes make tea an article of diet, instead of an occasional beverage, and the result is a lamentable amount of sickness. A portion of the reforming zeal, he says, which keeps up such a lively warfare against intoxicating drinks might advantageously be diverted to the repression of this very serious evil of tea-tippling; tea being as distinctly a narcotic poison as opium or alcohol, is as capable of ruining the digestion, of enfeebling and disordering the heart's action, and of generally shattering the nerves.

LIERNUR'S SYSTEM OF DRAINAGE.—We have received information, says the *Lancet*, that on the 3rd of May the Emperor of Russia signed a contract for the introduction into St. Petersburg, of Liernur pneumatic system of drainage and removal of sewage; which has already been described in this JOURNAL. It is first to be laid in one district containing 15,000 people, and then, if successful, to be extended to the whole city of 600,000 inhabitants. The report of the Russian engineers has been very favorable, and they have estimated the cost of laying down the Liernur triple system at less than that required to put down ordinary sewers on the water-flushing principle.

THE SHADE TREE QUESTION, was being discussed some time ago, and as shade trees are sometimes planted in the autumn, we would suggest that trees of not large growth but inclined to spread should be selected. These would shade the streets sufficiently but would not shade the dwellings in an injurious degree. Trees may be pruned into almost any form; and as the Toronto City Council are moving in the matter of shade-tree pruning, it might be well to give this point due consideration.

RUM AND TOBACCO.—An enlightened physician, Dr. Ferguson, has been, for a long time, studying the deterioration of the English factory population. In the September number of this JOURNAL we gave an extract touching his evidence upon the subject before the Royal Commission. A September number of the *Medical and Surgical Reporter*, says: He (Dr. F.) finds the deterioration attributable "not to the work in the mills, but chiefly to those two curses of modern life, alcoholic drinks and the abuse of tobacco. The profession, *as a unit*, ought to exert themselves to diminish the consumption of these articles."

TO AVOID CONTAGION.—Persons who breathe through the nose only, and avoid swallowing, in the sick chamber, may come out of it unharmed; for the solid particles are arrested in their long circuitous passage through the dampened channel which leads from the nostrils to the windpipe. An additional safeguard is to sit so that the draught of air may be from you toward the patient; hence, not between him and a fireplace.

IN CASE OF ACCIDENT, Professor Wilder, of Cornell University, gives these short rules for action.

If an artery is cut, (from which the blood flows in jets,) compress it above the wound; if a vein is cut, (from which the blood flows in a continuous stream,) compress it below.

If choked, go upon all fours and cough.

For slight burns, dip the parts in cold water; if the skin is destroyed, cover with varnish, or something to exclude air.

For apoplexy, (in which the face is *usually* florid,) raise the head and body; for fainting, (in which the face is *always* pale,) lay the person flat.

DISPOSAL OF EXCRETA.—Apropos to the article in this number, and in that of August, of this JOURNAL, on the disposal of excreta, we find from the report of the meeting, in July last, of the Michigan State Board of Health, (kindly sent to us by the Secretary, Dr. H. B. Baker,) that Dr. Hitchcock, President of the Board, presented an important paper on the "Disposal of Human Excreta." He believed the dry-earth system would eventually supersede vaults and water-closets. "It is the most sanitary, rational, and economical method." He says, "All dead matter when buried in the earth for a time seems capable of a resurrection and a new life, and that the really important and comprehensive question in the disposal of excreta, is, how shall it the soonest and in the safest manner be commingled with the earth. Good privies are signs of higher civilization than fine palaces and grand monuments." Cases illustrating the dangers of bad locations of them were given, especially their proximity to wells, and cases cited where typhoid fever had arisen from this cause. The paper was ordered to be published in the report for the present year.

The value of different absorbents, such as lime, ashes, earth, etc., was discussed. Dry earth, not sand, was considered best for all practical purposes.

At a late meeting of an "Association of Sanitary Inspectors," at Bothwell, Eng., the following resolution was adopted:—

"That this Association, after very carefully considering the different systems of sewage disposal, is of opinion that it is desirable to represent to the delegates of the combined area, the necessity of their determining on adopting some dry portable system, such as that of the Goux Company, under the entire superintendence of the inspector of nuisances, as the simplest system of disposing of village sewage."

The President of the Association stated that he had lately visited Halifax and Aldershot, where he had seen the Goux system in full operation, and had come to the conclusion that it was the best he had yet examined and tested, both for towns and villages. Dr. Wilson* gives the following description of the Goux system:

* Handbook of Hygiene, by George Wilson, M.A., M.D.

"The tubs for receiving the excrement are lined with some dry absorbent material, such as chaff, straw, refuse, hay, dry ferns, together with a small percentage of sulphate of iron or sulphate of lime." The materials are pressed close to the bottom and sides of the tub by means of a mould, which is afterwards withdrawn. A separate bin must be used for the ashes and house refuse; but urine may be emptied into the tub, and is supposed to be absorbed by the lining, the excreta, remaining tolerably dry. The tub is removed once or twice a week, according to circumstances.

THE DUBLIN SANITARY ASSOCIATION lately held its third annual meeting, and the report showed that the number of its members was 272. A resolution was adopted calling for a public enquiry into the cause of the present unsanitary state of Dublin and the excessive death rate which prevailed.

The Popular Science Monthly, Appleton & Co., New York, Oct.' 1875, says: "The SANITARY JOURNAL, edited by Edward Playter, M.D., Toronto, both in its editorial and its selected matter, gives evidence of being conducted with ability. It is to be hoped that the enterprise will be sustained by the Canadian public."

The *Kingston British Whig*, Sep. 7, 1875, says: "THE SANITARY JOURNAL, edited by Dr. Playter, is performing a very useful mission, in instructing the public mind on some of the questions which vitally affect the public health. The papers are written very ably, and interest one while they convey a large amount of information. The publication should have a wide circulation."

PUBLIC HEALTH MAGAZINE, Geo. A. Baynes, M.D., editor; monthly, pp. 32, $2 per annum. J. Dougall & Son, Montreal.

This is a new magazine, consisting largely of reports and original papers on important sanitary subjects. The field for sanitary labor is large and demands many laborers, at Montreal it appears to need vigorous husbandry. We wish our cotemporary the success it merits.

MEDICAL AND SURGICAL REPORTER, D. G. Brinton, M. D., Editor, Philadelphia; weekly, Pp. 20, 8vo., $5 per annum; one of the most welcome of our exchanges.

THE SANITARY RECORD, a journal of public health, London, Eng., weekly, 17s. 4d., stg., per annum. A concise record of sanitary matters in Great Britain; the health of watering places being a special feature.