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NOTES AND EXTRACTS ON DISPOSAL OF SEWAGE.

It seems to be of the utmost importance that this, the great hygienic question of the day, should be freely discussed in this growing country. The strong and universal tendency for men to flow into great centres, to congregate into cities, which is as marked in Canada as elsewhere, constantly magnifies the importance of the question. The purity of the two most important essentials of life, namely, air and water, depends upon the proper removal and disposal of all excrementitious matter. Hundreds of deaths and much sickness not ending in death, are undoubtedly caused, as any thoughtful person must know, in Toronto and other cities, towns, and villages throughout Canada, every year by air and water contaminated with human excrement. The evil is constantly and, I may say, rapidly accumulating, intensifying, and it is lamentable to think of the apathy of the people in the midst of it.

The following very 'common sense' remarks upon this question are from the *Sanitary Record* of June 1st, inst. :—

In order to grapple successfully with the 'Sewage Difficulty' it is above all things necessary to understand or comprehend where the difficulty lies, and what it consists of.

In its simplest form, the sewage difficulty is the difficulty connected with collecting and disposing of the daily excrement of the people, and also the slop or refuse water from our households. Other difficulties have been superadded in the shape of the natural rainfall and even the drainage of homesteads, farmyards, and cattle folds, but as these are voluntary difficulties they need not be considered at all. The sanitary authority that hampers itself with troubles by attempting to purify storm-water or to provide improvident agriculturalists with drains for their yards deserves neither pity nor help. Storm-water may occasionally be used for its flushing powers, but it is quite out of place as a rule in sewers.

The first thing to be considered is whether there shall be sewers

or no sewers. There are thousands of places where the benefits conferred by sewers are by no means commensurate with their cost. In populous places—by populous is meant not absolute number but comparative number on a similar area—it will be found that combination and sewage construction will be cheaper than individual drainage or collection. In isolated cases or in straggling villages isolated or semi-isolated treatment will on economic grounds be imperative. Another important matter must be considered before deciding for or against sewers and sewage works, and that is the nature of the natural outfall. When a good fall can be obtained, and land suitable for filtration or irrigation purposes all the year round lies handy, a great deal may be said for sewers and sewage works. But where nature's hand is adverse, and when no fall and no land out of reach of floods can be obtained, the expense of pumping must be taken into consideration.

Few will be found to oppose sewers and sewage works where (1) there is a compact population; (2) a good fall; (3) land at the outfall not liable to be flooded; (4) the separate system. In all such cases sewers by all means, and if a plentiful supply of water can be obtained, water closets.

Old sewage dangers and mistakes must be avoided, and they are chiefly these:

Too large sewers and of defective shape and imperfect materials, *i. e.*, brick, unsocketed pipes, or stone.

Direct communication between houses and sewers.

Defective closets, pipes, and trappings.

Therefore sanitary socketed pipes, ventilation, direct disconnection of houses and sewers, and simple water-closets with ample flush power, must be *sine qua nons* in all new sewage schemes. The treatment at the outfall will depend on local considerations, but utilization by cropping is always to be preferred to mere filtration.

But it may and will often happen that for local and geographical reasons, neither a sewage farm nor even a filter ground can be obtained, or it may be that the isolation of the houses renders the cost of sewer-construction out of all proportion to the benefits received. Still there is the same proportional amount of excrement to be collected and slop water to be disposed of. In these cases the dry-systems come in as friends in need. All that is required with the closets, is uniformity, get-at-ability, and systematic collection. The collection should be made at least once a week, and the sooner the material collected is disposed of the better in every sense. There yet remains the slop-water, and this must be dealt with either locally or in combination. When there is ground attached to a house no difficulty need be experienced. On this point Dr. Cornelius Fox's little book on slop disposal may, with advantage, be consulted.

It must be remembered that the slop or sewage water made by a household is on the average no very formidable amount, and that when it cannot be utilized it may be collected in an iron cesspit or cesspits and disposed of by application to land.

The great difficulty connected with sewage is the admixture of storm water. Keep this out and a little administrative ability only is required, and the sewage difficulty vanishes. It is quite possible, if not easy, to be healthy and cleanly, either with or without sewers; only thoroughness must be the motto whatever system of conservancy is adopted. Moreover some trouble and expense, both continuous, will be entailed whatever system be adopted. This is a tax and a natural consequence of the requirements and necessities arising out of civilization.

A writer, Mr. A. S. Jones, in a London exchange, also says, 'Separate the rain-water, for which natural or artificial channels everywhere abound, and convey the sewage properly by the cheapest and shortest means of transport to the land, and the farmers will do the rest as they used to do long before we thought of pouring sewage and rainfall in one ungovernable torrent into the nearest brook or river without regard to consequences.

The cheapest means of transport can only be decided upon reference to local circumstances, but in every case whether by pails in a van, by pumping, or gravitation in a pipe, economy will always be secured as common-sense suggests by riviting the attention upon the separate removal of all foul matter by all means.

If the site of a town requires draining let it have it by all means, but do not complicate two simple operations by a vain effort to 'kill two birds with one stone.'

The most important contribution to our knowledge on the disposition of sewage, during last year, has been from a conference of leading sanitarians and engineers in England, under the auspices of the Society of Arts, held in London, May 9, 10, and 11, 1876, at which there were full reports and discussions on all branches of the subject. Very full returns were got from one hundred and sixty towns; of which twelve disposed of their sewage by direct irrigation, twenty-two by irrigation after treatment (subsidence of solid parts), three by subsidence, thirteen by filtration, seven by precipitation and filtration, nine by precipitation, eighty-one by discharge into streams, and in nineteen, cesspools and dry vaults were used instead of sewers. The results arrived at are embodied in the following report:— *

'The chairman of the conference and the executive committee, after having carefully considered the information furnished from the various localities, as well as the facts brought forward during the conference, have to submit the following as the conclusions to which such information appears to lead:—

'1. In certain localities, where land at a reasonable price can be procured, with favorable natural gradients, with soil of a suitable quality, and in sufficient quantity, a sewage farm, if properly conducted, is apparently the best method of disposing of water-carried sewage. It

* Eighth Annual Report of the State Board of Health of Massachusetts, 1876.

is essential, however, to bear in mind that a profit should not be looked for by the locality establishing the sewage farm, and only a moderate one by the farmer.

'2. With regard to the various processes based upon subsidence, precipitation or filtration, it is evident that in some of them a sufficiently purified effluent can be produced for discharge, without injurious result, *into water-courses and rivers of sufficient magnitude for its considerable dilution;* and that for many towns, where land is not readily obtained at a moderate price, those particular processes afford the most suitable means of disposing of water-carried sewage. It appears, further, that the sludge, in a manurial point of view, is of low and uncertain commercial value; that the cost of its conversion into a valuable manure will preclude the attainment of any adequate return on the outlay and working expenses connected therewith, and that means must therefore be used for getting rid of it without reference to possible profit.

'3. In towns where a water-carried system is employed, a rapid flow, thorough ventilation, a proper connection of the house drains and pipes with the sewers, and their arrangement and maintenance in an efficient condition, are absolutely essential as regards health; hitherto sufficient precautions have rarely been taken for efficiently insuring all the foregoing conditions.

'4. With regard to the various dry systems, where collection at short intervals is properly carried out, the result, appears to be satisfactory; but no real profitable application of any of them appears as yet to have been accomplished.

'5. The old midden or privy system, in populous districts, should be discontinued, and prohibited by law.

'6. Sufficient information was not brought forward at the conference to enable the committee to express an opinion in regard to any of the foreign systems.

'7. It was conclusively shown that no one system for disposing of sewage could be adopted for universal use; that different localities require different methods, to suit their special peculiarties, and also that, as a rule, no profit can be derived at present from sewage utilization.

'8. For health sake, without consideration of commercial profit, sewage and excreta must be got rid of at any cost.

'The executive committee, whilst abstaining from submitting any extensive measures, have no hesitation in recommending that the prevention of dangerous effects from sewage gases should receive the immediate attention of the Legislature, and they submit the following resolutions as the basis of petitions to Parliament:—

'1. That the protection of public health from typhoid and other diseases, demands that an amending Act of Parliament be passed, as soon as possible, to secure that all house drains connected with public sewers in the metropolis and towns having an urban authority, should be placed under the inspection and control of local sani-

tary authorities, who shall be bound to see to the effective construction and due maintenance of all such house drains, pipes, and connections. . . . . .

'2. That plans of such drains and connections be deposited in the charge of the respective local authorities, who shall be bound to exhibit them and supply copies of them to the public on payment of a moderate fee.

'3. That the owners of houses be compelled by law to send to the respective local authorities, within a specified time after the passing of the Act, plans of all house drains on an appointed scale.

'(Signed by) The Right Hon. JAMES STANSFELD, M.P.
'Chairman of the Conference.
'Lord ALFRED S. CHURCHILL, Chairman of the Council,
'F. A. ABEL, F.R.S., President of the Chemical Society,
'Sir HENRY COLE, K.C.B.
'Capt. DOUGLAS GALTON, R.E., C.B., F.R.S.,
'Lt-Col. E. F. DU CANE, R.E., C.B., Sur-Gen. of Prisons.
Members of the Executive Committee.'

At Gennevilliers, Paris, according to M. de la Trehonnais,—'Sewage, containing forty-three grammes of nitrogen per ton before its application to the land, when analyzed after percolation through the soil, gave scarcely any trace of it in a decomposable state. Only 1.6 grammes of nitrogen in a state of mineral ammonia could be found. It was the same with the quantity of soluble oxygen. The sewage-water, when laid on the land, scarcely contained two cubic centimeters of oxygen per quart. On its effluence from the soil, it was found to contain from eight to ten, which is the unerring characteristic of healthy water.

Prof. Wanklyn thinks that the contagium of the diseases communicable by infected water are of an albuminoid character, and of such definite form, etc, as to be removed by efficient filtration. Dr. Alfred Carpenter, whose sixteen years' experience at Croyden entitles his opinion to great consideration, says: —

'The most important operation that takes place on a sewage farm, is the destructlon of contagious particles. The moment they are brought into contact with the spongioles on the rootlets of sewage-grown crops, as may be easily seen in any field of rye-grass which is being irrigated by sewage, the spongioles seize upon the albuminous matters in the sewage by a kind of elective affinity, including the contagium-particles, remove them from the water and digest them with an avidity which is most remarkable; no putrefaction takes plaee, no retrogade decomposition arises, but the albuminous matter is digested as perfectly as white of egg is digested by the human stomach. Putrefaction is no part of sewage utilization, and, if putrefaction takes place, there is a corresponding decrease of productive power, and also a proof that sewage farming is not properly carrled out.'

Professor Ansted, F.R.S., in a paper read before the Society of

Arts, March 14, 1877, (*Public Health.—Boston Med. & Surg. Jour.*,) described the methods lately introduced at Manchester and previously tried at Salford for the disposal of the refuse and sewage of towns. This refuse he explained as consisting of solid and liquid materials, namely: (1) solid excreta, animal refuse from slaughter-houses, decaying animal and vegetable matters collected from markets, house refuse (such as ashes and dry rubbish,) and street sweepings; and (2) urine and house-slops, waste water from dye-works, breweries and various manufactures, and waste-water from water-supply and rain. The process recently adopted at Manchester professes to dispose of all these various kinds of refuse, yielding as the results of treatment several perfectly innoxious materials, each having a definite value in the market, and reducing the small balance to a perfectly inert and harmless residuum; the whole operation being effected without involving any nuisance whatever. The method is a combination of the dry-sewage system and combustion. By these means, during the year previous to August 31, 1876, in the city of Manchester, an inland river town of 359,000 inhabitants, the large quantity of 163,000 tons (500 tons daily) of refuse was disposed of in the manner alluded to. It is intended that the entire town refuse shall be treated in this way ultimately.

The process is in brief as follows: The household excreta are collected in pails, after the Rochedale plan. The material is deodorized, partly by ashes thrown into the pails in the course of their daily use, partly by a mixture of charcoal (the product of the combustion process) and carbolic acid. The pails are hermetically sealed during their removal from the houses to the works. The contents of these pails, arrived at the town yard, are emptied upon a floor so constructed as to separate the solids from the fluids, which latter fall into a well-hole, whence they are pumped at once into a receptacle connected with apparatus, called a concretor, where the aqueous parts are evaporated. The solid parts of the sewage, consisting of one-third fæcal matter and two-thirds ashes, are ground up in mills like mortar-mills, with slaughter-house refuse, decayed fish, the concentrated urine obtained from the concretor, and a small quantity of gypsum to fix the ammonia. The produce is a manure without smell, and dry enough to be put into sacks and carried away.

The street-sweepings, house refuse and garbage, and general rubbish, are carbonized in furnaces specially adapted for the purpose. The resulting charcoal amounts to upwards of forty per cent. of the weight of the material charred, and is available for deodorizing purposes. Other furnaces (called destructors) are used for the combustion of dry rubbish, and the clinkers which result are ground up with twice their weight of quicklime, and sold profitably for use in mortar. The waste heat from these destructor-furnaces is utilized in the operation of the concretors for evaporating the liquid (urine) portion of the pail contents.

Professor Ansted believes that the method employed is a satisfactory solution of the sewage question in its application to inland towns which cannot discharge their waste directly into the sea. The system requires no chemicals, no large extent of land, no costly apparatus, and no superior intelligence to work it. It checks the cumulative nuisance of polluted streams, and reserves for those streams the office of carrying only waste water and storm water to the ocean.

VENTILATION OF DRAINS.—ARE WATER-TRAPS NECESSARY.

BY ERNEST TURNER, F.R.I.B.A.

That there can be no smell from a drain because it is trapped is now known to be a fallacy, although there are many that still cling to the idea that a half inch or less water-seal gives immunity from the entrance of foul gases into dwelling-houses; but it has been conclusively proved that gases can pass water-traps by three methods—viz., by pressure from without, by suction from within, and by absorption and evaporation.

One of the latest theories is that water-traps are unnecessary under closet basins, and under lavatories, sinks, baths, etc., even if the waste be connected with the drain, provided certain patents and means of ventilation be adopted. This view, however requires very careful consideration and experiment before we accept it. 'Wise men shave on the chins of fools,' and there are many, having too great a faith in advertisements, and forgetting the maxim 'Caveat emptor,' who are willing to pay to be practised upon without really considering that the question may be one of life and death.

In a matter of so much moment the public should feel indebted to those who devote time and money in testing these theories before putting them into actual practice, and honestly give the results of their experience.

Those incompetent to make trials for themselves, and unable to obtain the advice of the expert, will do well to remember the old lines—

> Be not the first on whom the new is tried,
> Nor yet the last to set the old aside.

Before coming to the main subject of this article, I desire to state my long-formed conviction that it is a common error to suppose that the offensive effluvia in water-closets always proceeds from the sewer, for where 'pan-closets' are used it often really arises from decomposing matter collected on the outside of the basin and copper pan and on the inside of the iron container. I could instance numerous cases in which this nuisance has, without other means, been temporarily stayed by cleansing the apparatus and burning out the container, or entirely removed by the substitution of a valve closet. This has been recognized by Mr. Buchan, of

Glasgow, who, in his admirable little treatise on 'Plumbing,' suggests the introduction of two ventilating pipes into the container; and by Mr. Livesey, of Westminster, who, by means of a perforated pipe, flushes the sides of the container; but they will probably both agree with me that a good 'valve closet' is the best apparatus, rendering as it does, all such measures unnecessary

There are some bold enough to assert that with a proper inlet for air into the drain or soil-pipe, and an extracting cowl at the top, even the sink or other wastes may be connected with the drains or soil-pipes without trapes, and that they will really act as auxiliary inlets, the suction being in all cases towards the cowl.

I will briefly describe an experiment made at the house of Professor W. T. Gairdner. The soil-pipe runs up the centre of the house, and has a ventilating pipe carried above the ridge, the entire height being about 60 feet; at the foot of this runs the drain, and in the area about 27 feet distant is fixed one of Buchan's ventilating traps. There was at the time of the experiment a strong natural draught inwards and upwards; smoke then being admitted at the eye of the trap emerging from the ventilating pipe above the roof in one minute. A Banner's three-inch cowl was then placed upon the top, and the smoke showed itself in fifty-nine seconds; after the cowl had been on some time the smoke came out at the wrong end, and again at both ends together; the inlet end of the cowl was then plugged up, and the smoke poured out just the same; the plug was then withdrawn, and the water was taken out first from the sink-trap in the kitchen, and afterwards from one of the water-closet traps; and in each case, instead of there being an inward suction to the soil-pipe, the smoke poured into the house, and even although in the kitchen a door was left open to the outer air.

It has been stated that the force of the wind is at all times sufficient to cause these cowls to act as exhausters, that this is not the case will be seen from the following sketch:— . . . .

At the house of Dr. Fergus the rain-water pipes join the soil-pipe, and the ventilation is found satisfactory. Here also the same description of cowl was used, the rain-water pipes being closed up, and the same result ensued.

At another house the ventilating trap was placed immediately at the foot of the soil-pipes, and a Banner's cowl at the top: but whenever the water-seal was dispensed with the smoke came pouring into the house.

Now, with pan and valve closets it will occasionally happen that there is no water in the basin; and if there is no trap below the basin it is apparent that danger must ensue; it is not necessary to perpetuate the D trap; a properly constructed syphon is better. With regard to wastes from baths, sinks, etc., without traps, the danger is of course constant; but, as so often pointed out, wherever it is practicable they should be disconnected, and made to discharge in the open air.

My experience is that with an inlet at the ground level, and an open pipe carried above the roof without a cowl, the draught will be sometime upwards and sometime downwards, and it is for this reason that I have in previous articles, pointed out that discretion should be exercised as to the position of gratings in confined areas.

Messrs. Hellyer inform me that they are averse to the utter exhausting cowls on the ground that the water in the traps may too readily evaporate; if a house were unoccupied for some time this might occur, but the objection can, I think, hardly be taken into consideration in general practice.

An upward motion of the air is desirable, and this is necessarily more often obtained with than without the cowl. Banner's cowl is good in a brisk breeze, but Braby's Archimedean Screw Ventilator appears to be acted upon by a less force. Boyle's, which does not revolve, is perhaps better than either as a soil-pipe ventilator. Whether these or any of the numerous cowls be used, I am of opinion that we cannot safely dispense altogether with the water-trap, and that it must still be considered a valuable auxiliary to prevent the entrance of foul air into our dwelling-houses.

PROFESSOR TYNDALL ON GERMS.

NOTES OF LECTURE BY PROFESSOR TYNDALL, F.R.S., AT ROYAL INSTITUTION, JUNE 8TH, 1877.—(*Med. Times and Gazette.*)

It is a well-known fact, that infusions of vegetable or animal substances, which when made are transparent, become in the course of a few hours, if kept at a proper temperature, turbid, and their sweet smell becomes putrid. This is owing to swarms of minute organisms which from their appearing in infusions are called Infusoria. The lowest class of these are called Bacteria.

There are two theories as to their origin. One, that they are developed from eggs or germs like the higher forms of animal and vegetable life; the other, that they arise spontaneously.

The chief advocate of the latter theory is M. Pouchet, of Rouen. His writings show how he arrived at his conclusions. He convinced himself by "meditation" that spontaneous generation was one of nature's modes of action, and then set to work to find evidence in support of his theory. His works are partially scientific, partly theological, and partly satirical. He twits the "ovarists" with the difficulties of their theories. If there is a vast number of germs floating about in the air, as alleged by them, why cannot we see them? From their accounts they should form a thick dark cloud obscuring the sky. These theories were inconsistent with the idea of a creative wisdom.

However, Professor Tyndall said, it was an established fact that the blue of the sky, as seen from the highest elevations and above possibility of contamination with earth, was caused by vast numbers of foreign bodies floating in the atmosphere, so small as to be un-

distinguishable by a microscope magnifying by 1500 diameters. This had been the highest power available until Dallinger (to whom Professor Tyndall referred in terms of eulogy as a microscropist worthy of a far wider reputation than he had attained) had produced a power magnifying 15,000 diameters. This, however, failed to distinguish those minute germs. The only means of discovering their presence in the atmosphere was the electric light.

During his investigations or "battle with the germs," which occupied him for six months in 1875-76, he had found it to be a rule without exception that an infusion of turnip, cucumber, beef, or mutton, which had been boiled for a period of five minutes, would not putrefy in an atmosphere in which all germs had been allowed to subside. But during the continuance of these investigations in the autumn of 1876, he found that infusions apparently the same as those prepared in the previous year were not sterilised by boiling for fifteen minutes. There was no opposition, to his mind, between these results; the only question was, whence did the difference arise? Either these infusions had, in October, 1876, a power of spontaneous generation which they had not in 1875, or there was a more obstinate contagium present in these which the former had escaped.

Acting on the assumption that the latter was the correct interpretation, he transferred his experiments from the Laboratory at the Royal Institution to the Jodrell Laboratory at Kew, in hopes of obtaining a purer atmosphere. The result was five minutes' boiling at Kew was sufficient to sterilise infusions which had withstood boiling for 200 minutes at the Royal Institution. Either the infusions had lost a generative power at Kew which they possessed in the Laboratory, or there was a special contagium in the air of the latter place. Next he erected on the roof of the Royal Institution a shed in which he put his chambers. The infusions were carefully prepared in the shed, but the result was failure—the atmosphere in the shed was as bad as that in the Laboratory. It occurred to him that the shed might have been infected by his assistants passing to-and-fro between it and the Laboratory, and bringing the contagium with them. He therefore disinfected the shed by washing it with carbolic acid and water and caustic potash. He and his assistants wore proper uninfected clothes, and the result was that the infusions again became sterile after five minutes' boiling. A rod thirty feet long would connect the shed with the Laboratory. Had the infusions a generative power at one end of the rod, which they had not at the other end; or was the difference caused by a special contagium present in the Laboratory and not in the shed?

After exhibiting some specimens of infusion to illustrate the results of his experiments, the professor pointed out the parallel between the spread of infection from the Laboratory to the shed, and spread of infectious diseases in hospitals and other places by means of the passage to-and-fro of attendants.

The Professor then exhibited, by means of the electric light, the

contagium in a sample of old hay brought from Heathfield, in Sussex, clouds of fine particles being seen to arise from the hay when shaken beneath the ray of light. This contagium was far more infectious than that ordinarily found in common air, and far more obstinate. The particles were extremely fine, and able to pass unaltered through 300 layers of filter-paper. This was the contagium which had infected the Laboratory, and was so remarkable for its resistance to heat.

If these were its effects on infusions of turnip or beef, what might its effects not be on open wounds in a hospital? This was a matter now being taken up by the followers of the Antiseptic School of Surgery, and was well worthy of the attention of all surgeons.

This difference between the powers of resistance of various species of contagia was of great moment with regard to the artificial preservation of meats and vegetables. He was not aware of any actual instance, but could imagine great financial reverses occurring to those engaged in these trades of infection from a contagium which would withstand the ordinary means of preservation from putrefaction. He knew that brewers were sometimes liable to checks from causes apparently inexplicable, and he thought that much might be traced to the special form of contagium. It would be possible to cause a great disaster by carrying a truss of hay like that which he had just exhibited through a preserving establishment or a brewery

The Professor then referred to some tables exhibited on the boards above, giving a summary of the different periods for which he had subjected infusions of old hay, of turnip, and cucumber infected with hay dust, and of beef prepared in an infective atmosphere. The result appeared to be that the turnip and cucumber infusions could stand boiling for 180 minutes and yet putrefy. The beef putrefied after boiling for 300 minutes, and the old hay after boiling for 240 minutes. In one instance the sample of the hay infusion showed life after it had been boiled for 480 minutes—eight hours.

Boiling does not destroy the power of putrefication possessed by any substance; it destroys, or is intended to destroy, the germs that are in the infusion or substance at the time. The germs that make an infusion putrefy are those in it, and not those in the air above. This the Professor had established by using a special form of bulb, which he was enabled to fill with putrified germless air before he introduced the infusion. The infusion nevertheless putrefied, showing that it was the germ in it, and not any outside it, which were the cause of its putrefication. When an infusion has been sterilised it may again be made putrefactive by introduction of fresh germs.

It was a grave error to confuse the germs of infusion with the adult forms. Heat destroyed the adult organism, but the germs from which they sprang were comparatively indestructible. This was illustrated by the results of Professor Koch's researches on that dangerous and fatal disease, *Milzbrand*. He had found that an ani-

mal might with impunity take the adult organism after they had been subjected to a very small amount of heat, but that the germs would withstand a lengthened period of boiling without losing their power of development. One minute's boiling will kill the adult, while eight hours is insufficient to kill the germ. It was not even necessary to raise the heat to boiling-point, for a heat of 245° Fahr. would kill the adult.

One result of his (Professor Tyndall's) experiments had been the method of disinfection by discontinuous heating. The substance to be disinfected should be subjected for one minute to a temperature of 140° Fahr.; this would kill all adult organisms. After a few hours' intermission, during which the substance is kept at a proper temperature, to enable the indestructible germs to arrive at a sufficiently sensitive state of existence the substance should be again subjected to a mild heat. By this method an infusion would be more perfectly sterilised by an amount of heating which would in the whole amount to five minutes only, than by boiling for many continuous hours.

In one instance Professor Tyndall had noticed that an infusion contained in a sealed flask partially putrefied: a thick scum formed on the top, and the lower parts remained clear. From this and other reasons it had been inferred that bacteria resembled higher organisms in their dependence on oxygen for existence, and that in the present case the bacteria had crowded to the top of the liquid infusion to follow the air, and had thus stifled those beneath. He also showed an instance of a small quantity of a putrefying infusion which had quite exhausted all the oxygen in the large sealed flask in which it had been kept for some time.

Infusions from which air had been perfectly exhausted by means of the Sprengel air-pump, had also remained sterile.

On the assumption that the mode of life of these lowest forms was the same as those of the highest, and knowing that it had been proved by experiment on the higher animals that an excess of oxygen acted as poison (an experiment which the Professor had never performed, and was not likely ever to perform, but of which he took occasion to say that he did not see how science was to make progress, and how diseases were to be combated without such experiments), he tried the experiment of subjecting infusions of highly putrefactive matter such as cucumber and turnip to pressure of 200 atmospheres of oxygen, and found that they remained quite sterile. This result was not due to the mechanical pressure, but to the poisonous effects of the oxogen, for infusions subjected to a like pressure with common air had putrefied.

In conclusion, the Professor said that he hardly thought it necessary to summarise what had been there brought before his audience. In fact, the whole discourse was but a summing up of eight months of incessant labour. From the beginning to the end of the inquiry there was not, as had been seen, a shadow of evidence in favour of

the doctrine of spontaneous generation; there was, on the contrary, overwhelming evidence against it; but he warned his hearers not to carry away with them the notion sometimes erroneously ascribed to him, that he deemed spontaneous generation impossible, or that he wished to limit the power of matter in relation to life. His views on that subject ought to be well known. But possibility was one thing, and proof was another; and when in the present day he sought for experimental evidence of the transformation of the non-living unto the living, he was led inexorably to the conclusion that no such evidence existed, and that in the lowest, as well as in the highest, of organised creatures the method of nature was that life should be the issue of antecedents life.

FERMENTATION.—ARE ZYMOTIC DISEASES FERMENTATIOUS?

BY J. S. CAULKINS, M.D., IN DETROIT MED. JOUR.

The writer of this communication would observe as introductory, that the interest that the practical physician, as distinguished from the mere scientist, will feel in a paper on the subject of fermentation, arises from the light which its study throws on the pathology of a class of diseases second to none in importance, namely the Zymotic diseases.

Typhoid fever, scarlet fever, dysentery and diphtheria are topics of pre-eminent interest to the philanthropic physician, since we have as yet no prophylactic against them as we have against small-pox, and no specific for them as we have for ague.

In the past, the treatment of these diseases has been tentative and empirical, and necessarily so, for the reason that their causes were unknown—in the future, a day will come when their treatment will be specific and rational; but that day cannot arrive till study has made us acquainted with these causes and their conditions.

The present is the transition period. We see clearly the nature of these causes (possibly know one or two) and the search for the rest is pushed forward with industry and zeal.

Most organic bodies are subject to a molecular change, by which they either acquire new properties, or are split up into several new substances, which molecular change we call fermentation.

Fermentation belongs partly to chemistry and partly to biology, the chemical reactions being believed to be the work of living microscopical organisms belong to the natural order of fungi.

There are many fermentations, each organic substance having one peculiar to itself, but the process in every case is essentially the same or similar. To state the case as plainly as possible, we may say, that each organic substance is liable to the attack of a microphyte which finds in it the conditions which constitute an appropriate nidus for its proliferation.

The spores of these fungi are in the atmosphere, and are so

abundant that no organic substance can be, even for a short time, exposed to the air, without being infected by them sufficiently to cause its peculiar fermentation under proper conditions of heat and moisture; and the process will not stop here for some of its derivatives will prove the appropriate nidus for other spores, and a second fermentation will follow the first. The derivatives of this second fermentation will in turn be found to be the nidus of other spores, and this process never stops till the original organic substance is resolved into water, carbon dioxide and mineral salts.

Several of these fermentations, especially the alcoholic, the acetous, the lactic acid, and the putrefactive, have been well studied and their microphytes are known; others are almost wholly unknown. The best understood of all these is the alcoholic, and (since every family has a family resemblance, and the fermentations constitute a well-marked family), it will serve our purpose as a type of the process in general, and we can make use of its phenomena to illustrate and explain those of fermentation in disease.

The family resemblance which is the most striking, and which we shall make the most use of in explaining some of the phenomena of the contageous diseases, consists in the fact, that in every fermentation, some of the derivatives are volatile. If it does not give rise to any such volatile or odoriferous product it must be quite unimportant. Generally speaking you can easily find when a fermentation is going on, if you cannot see it, you can smell it.

It will be best before going on with this discussion to glance briefly at the grounds for the belief which has been stated; for truth and candor compel us to admit that the doctrine is comparatively new—that Liebig denied it, and that it is doubted by many at the present time.

Is the physiological doctrine of fermentation fact or theory? If it be only theory, what other theory is its rival? In searching for answers to these questions, if it be proved that the relation of the yeast plant to the alcoholic fermentation is one of cause and effect, it may be fairly assumed that the other fermentations bear the same relation to their accompanying microphytes; that it is the mycodema that turns alcohol to vinegar; that it is the vibrio that turns milk sour; that it is the bacterium that makes the albumoids putrify, and so on through the rest of the series. By the same process of reasoning we shall be warranted, if we can show that the zymonic diseases bear the essential marks of fermentations, in assuming that they are caused by mycrophytes.

The substance, beer yeast, which seems to be the central point of attack and defence in this contest, has been known to the human race since the pre-historic period. It is highly probable that it was used by our Aryan ancestors, as leaven to make bread to eat and beer to drink, in their original home in Asia, before they began their westward migrations. It is thought by some to have been known in the early Egyptian civilization, but if so, it is strange that the children

of Israel did not carry the knowledge with them in their exodus. There is no mention of beer in their Scriptures, unless it is comprehended under the term wine, which is probably not the case, since wine is called red, and frequently mentioned in connection with the grape, but never with barley. The leaven which is frequently spoken of, was undoubtedly sour dough. Perhaps the reason that beer is not mentioned in the Hebrew scriptures is, that the art of making it was lost during the wanderings in the wilderness where there were no materials for the manufacture. So it would seem, from a passage in Plinius, that the Romans lost the art and relearned it from the Gauls.

During the dark ages, the use of fermented drinks made of grain, fruits, or honey, became very extensive and has increased to the present time.

The ancients had some singular and absurd notions concerning leaven, but were obliged to notice its capacity to impart its own condition to other substances, and there were among them from time to time advanced minds that saw that the process was analogous to the reproductive power of animals and vegetables; but this remained conjecture with them, for the reason that they had no microscopes.

The microscope is little more than 200 years old, and it is nearly so long ago that Leeuwenhoek discovered the cells of yeast. It is strange that he did not reach the conclusion that they were alive, since he must have seen them bud and grow, but it did not occur to him that the phenomena was vital. For the next 150 years no one thought to observe the cells of yeast through the microscope, and the discovery that they are living organisms has been made within the memory of some of us, in 1835 by Latour and Schwann.

Berzilius died in the disbelief of the doctrine, and Liebig, though he admitted, with a bad grace that it might be true, denied stoutly that it had anything to do with fermentation.

The labors of Pasteur, as much as those of any one man, have thrown light on the functions of the yeast cell, and it was with him that Liebig with all his energy and ability carried on the sharpest controversy. He (Liebig) adopted the old doctrine of Stahl, the author of the theory of phlogiston which held undisputed sway in the world for more than a hundred years. Stahl thought that fermentation was motion, (which is true in a sense), that the particles of the ferment being in a state of motion, were capable of imparting that motion to the particles of the fermentable substances, which (being a mixture of salt, sulphur, oil and earth) were easily set in motion by the motion of the ferment. This theory of motion was re-modeled by Liebig. He held that all ferments were albuminous substances in a state of decomposition and that their particles being in a state of molecular motion, were capable of impressing that motion on the particles of substances with which they were brought into contact. This seems to us rational enough, and it is strange that Liebig should have been so infatuated with the idea.

It is still stranger that Berzelius should have been satisfied with his own explanation of fermentation. Rejecting equally the modern physiological doctrine and Liebig's molecular motion, he taught that the phenomena were caused by a *catalytic* force, (whatever that is), resident in the yeast. This theory and that of Liebig are conspicuous examples of explaining the unknown by the unknown. Pasteur is perhaps the most eminent advocate of the physiological doctrine of fermentation, and his candid and philosophical position, appealing to future investigation to prove the truth of his opinions, is in striking contrast to the whimsical quiddities of Berzelius, and the laborious mistakes of Liebig.

What we are to do now is to briefly canvass the arguments for and against the necessary agency of the torula in the alcoholic fermentation. If it is proved that the conversion of the sugar into alcohol and carbonic acid is really the work of the microphyte, we will conclude by a parity of reasoning that the other fermentations are the work or their accompanying microphytes, and will conclude further, that every fermentation has its microphyte, although yet undiscovered. The arguments pro and con are these:

(*a*) Fermentation with the formation of alcohol is accompanied by growth and reproduction of the torula. This alone proves nothing, for as the writer mentioned in the marginal note,* says, it may be cause or it may be consequence. As he puts it, chemical forces make the soil in which the germs take root and grow. It is alleged against the agency of the torula in the production of alcohol, that they will grow in sweetened water, and not produce any, if supplied with oxygen in sufficient quantity and certain salts, but this argument works the other way. It makes it probable that it is the torula that breaks up the molecule of sugar to get at its oxygen to support its respiration when heating material becomes scanty. While well supplied with air, it could assimilate what sugar it needed for its growth, without injury to the rest; deprived of it, it attacks the sugar to get the element of respiration. Losing part of its oxygen, the sugar tumbles to pieces like an arch whose keystone is withdrawn.

(*b*) It is shewn by Ludersdorf, that if the cells of the torula were broken down, fermentation was not produced after the yeast was mixed with sacharine solutions. On the chemical theory no plausible explantion can be given of this fact; on the physiological theory the explanation is plain.

(*c*) It was shewn by Dumas that the thin parts of the ferment had no effect on the fermentable substance, and that contact with the torula cell was necessary.

(*d*) Fermentation can be stopped at any stage by sufficient heat to kill the torula, and by various vegetable and mineral substances, which are capable of acting as poisons to it.

(*e*) The foregoing might seem to be enough for the champions

* Dr. Canniff, of Toronto.

of the chemical theory to dispose of, but here is the final and unanswerable argument: a portion of the sugar in the fermenting substance disappears, being used by the fungus to support its growth. This proves that the initiative step to fermentation is the attack of the torula on the molecule of sugar. Any other conceivable hypothesis would make the fungus live on the products of fermentation, which it cannot do.

The point is believed to be fully sustained that the alcoholic fermentation is only another name for the work of the yeast fungus in breaking up the sugar molecule, carrying with it the postulate that every fermentation has a fungus for its cause. In many cases the fungus is yet too be discovered, if not too small fort he microscope to reach.

We are coming now to the point of great interest to the practical man, that is the application of what we have just learned to diseases; but we must first enquire if we really have a place to apply it. Is the doctrine that the zymoses are fermentations certainly true, or is it a bit of scientific romance. Let us see what we ought to believe on this point, and in doing so will glance first at what we can learn without the aid of the microscope by comparing the phenomena of these diseases with those of fermentation.

What then are these similar phenomena? 1st. We have in both a stage of incubation. 2nd. The capacity of reproduction. 3rd. Specificity and fixity of type. 4th. The power of conferring sterilty on second exposure to their action. 5th. Susceptibility to destruction by the same agents, physical or chemical.

These resemblances, if they lack anything of establishing a common ordinal character for fermentation and contagious diseases, we complemented by the revelations of the microscope. Whatever scepticism we may feel on the question of the identification of the typhoid and scarlet fever fungi, we can have none concerning the cause of the rinderpest.

This contagious disease, to whose attack the human as well as the bovine race is liable, has been proved by Cohn and Koch to be the work of a microscopical fungus. Their experiments, on which the above conclusion is based, are so numerous and varied that there is no room to doubt its correctness.

Some objector may ask, 'admit all this, that the cause of this one contagious disease is a microphyte, is that fact sufficient proof that the rest have similar causes?' Confidence in the uniformity of the processes of nature (the basis of all our knowledge) enables us to answer this query affirmatively.

The relations of the whole class of contagious diseases to one another are such, that whatever is proved true of the origin of one of them must apply in a similar manner to the rest.

From the facts then in the case of the rinderpest, the deduction which the future will doubtless specifically prove true, may confidently be made, that *every contagious disease is essentially a fermentation.*

Having reached this conclusion let us revert to what I called the point of greatest interest to the practical man, the application to zymotic disease of the rules that guide us in dealing with fermentations.

The case presents the two plain indications of 1st. How to hinder the fermentation from beginning. 2nd. How to stop it after it begins.

Unfortunately not very much can be said on either point, for as yet our methods are imperfect as to the first, and in embryo as to the second. Of course the way to prevent a fermentation is to keep the ferment out of the fermentable matter. In this case the ferment is the zymotic virus proliferated in its nidus, the blood of the sick, and escaped into the atmosphere, and the fermentable matter is the fluid in the blood vessels of the unprotected well. Obviously the way to accomplish the indication is, by the use of germicides, to kill the cells of the virus (or their spores) as fast as they escape from their hotbed into the atmosphere.

In accomplishing this object, the appliances with which we are already acquainted are effective to some extent, and good use can be made of them, by keeping an atmosphere of disinfection around the sick; but Nature's method must be the best, and it becomes us to study diligently till we find what that method is. It is very certain that she has one by which she destroys the vitality of the poison of every zymosis soon after getting into the air,* otherwise there would be a constant accumulation of the different poisons in the atmosphere, that would in the end make the earth uninhabitable. The agent that Nature uses to kill the floating cells of the zymotic fungi must be either the actinic rays of sunlight or oxygen gas in its condensed and active form of ozone. Our plain duty is in the case, to study, to find out her true *modus facundi*, and having found, to imitate it. As to the second indication, the stopping of the fermentation, it can be done only by killing the ferment in the blood, and as already observed our methods of accomplishing this are yet in embryo. The internal use of certain germicides has been recommended, as for instance the bi-sulphites; but it is difficult to get them down fast enough. It takes a large quantity to disinfect 18 or 20 pounds of blood. Quinine has been proposed, and perhaps is the best we have, but a similar remark can be made of it, there being danger that the necessary large amount will produce toxic effects. Perhaps Wade's method with hydrobromic acid may obviate these dangers and it ought to be well tried.

The writer proposes to employ for this indication inhalations of ozone and at the same time to flood the system by way of absorption

* This is the general law. In some cases, especially in scarlet fever and the rinderpest, the virus hides away for an indefinite time from the agencies that usually effect its destruction. In such cases it is believed that it is the spores, and not the full grown cells that escape, seeds being much less perishable than their parent plant.

through the ailmentary canal, with a solution of the gas in water, *having found that such a solution will hinder the development of infusoria in fermentable liquids.*

Perhaps a solution of the gas in oil of turpentine diluted with some blander oil, and used by way of inunction, would be useful to disinfect the skin, especially in scarlet fever; of which disease, that which Koch found to be true of the rinderpest, is probably also true; namely, that its microphyte is a spore producing fungus with a double contagium, a fugitive one resident in the cells of the fungus, and a more permanent one resident in its spores, making it peculiarly necessary to disinfect the skin, since it is to that and the clothing in contact with it, that the spores coming through it with its secretion, would the longest cling. Whether any efficacy inheres in the above treatment, let its trial in the future answer.

Reference has been made to the fact, as explanatory of some things in zymotic disease, that volatile, generally odoriferous products are formed in all fermentations. These gaseous matters are poisonous as far as known, for instance in yeast fermentation the gas evolved is carbonic acid as it used to be called, in the acetous it is hydrogen, in the fermentation of urea it is carbonate of ammonia, in the putrefaction or fermentation of the albuminoids it is sulphydric acid and other unknown and sweet smelling substances. What a light might it not throw on the pathology of zymoses, if we knew what the gases are that are formed during the fermentation in the blood? . . .

Perhaps, when science has resolved disease into its ultimate factors it may be found that there is no more important one in all pestilence than the deadly gas, carbonic oxide. In reply to the question, some pages back 'what is it that is the rival of the physiological theory' the answer is that the one deserving of the most attention, is that which holds that zymotic disease is caused by poisons engendered by the decay of organic matter, the chemical theory. There are objections to this theory that seem insuperable. It does not account for the reproductive power and specificity of disease. How can a chemical poison reproduce itself in the system of the poisoned or elsewhere. The annals of chemistry give us no history of a case in which a poison reproduced itself, and it is incredible. As far as we know, reproductive power is solely a function of organization and life. The most plausible and ingenious view on this side of the question, that I remember to have read, is presented in the Report of the Michigan State Board of Health by the Secretary of the Board, H. B. Baker, in a paper on the reproduction of disease germs. He admits the formation in the blood, in zymotic diseases, of definitely constituted particles of matter that reproduce the disease, but advances the idea that the process instead of being a physiological genesis, may be analogous to that of crystalization, as when in a saturated solution of a salt, the introduction of a crystal of that salt produces a crop of similar crystals; and the conclusion is sought to be drawn, that the 'reproduction of bodies having similar forms

and qualities is not proof of the presence of life.' The point is well taken, the saturated solution is the albuminoid fluids of the blood, the introduced crystal is the minute speck of albuminoid which constitutes the virus of some disease, the reasoning is ingenious but not conclusive. The use of the term reproduction in the case is hardly allowable, since a gravel stone dropped into the solution might be as efficacious as a crystal of the dissolved salt, and so might be a sudden jar on the side of the containing vessel. The proper term then by which to express the formation of crystals is production instead of reproduction. Reproductive force in the sense that the physiologist understands it, is not proof of the presence of life, but is solely a function of life.

Our legitimate conclusions are these: 1st. All fermentation is caused by the presence and agency of organisms in the fermentable matters. 2nd. The contagious diseases are fermentations, and the organisms or these spores that cause them are recepted into the system from without. 3rd. Only a few of these are yet known, the rest must all be discovered as soon as may be, if not beyond the reach of the microscope. 4th. Following closely the discovery of the organisms of disease, we may hope to see that of the germicides to kill them, either before or after they get lodgement in the human system. 5th. And consequently the ultimate stamping out and total disappearance of the zymotic diseases.

DAMPNESS IN HOUSES.—HOW TO PREVENT.

So very many of the older-fashioned residences, and even the modern competitively built houses, suffer from dampness, that a few lines illustrative of its cause and cure may be found of service.

By way of furnishing the reader with an example, wherewith to gauge the measure of this subject, let us suppose that he builds a dwelling and out-houses, one story, and one brick thick, containing in all, say, ten reduced rods of brick-work. This would be equivalent to laying 45,000 bricks; and as it is now admitted that each of the commoner bricks can absorb one half-pint of water, it follows that, unless provided against by damp-courses or other arrangements, the building will be capable of holding, and will certainly hold, under certain granted conditions, over 5,600 gallons of water, which in weight would mount up to the high total of 25 tons, and would need, before the moisture could be evaporated, and the wall once thoroughly dried, the assistance of about three tons of coal, economically applied. Of course, it is not to be expected that all moisture can be kept from the walls; for even if the walls of the same house were built with the driest Aberdern, Cornish, or Wicklow granite, there would always remain about 570 gallons of water, distributed over the 3,060 cubic feet of walling. Walls of the same bulk, if built in some of the ordinary sandstones, would retain, in the

natural way as much as 1,500 gallons of water. The damage done by damp is not confined to damp spots and steaming walls, and general discomfort in the basement or ground floors only, for, owing to capillary attraction, it is on record, which cannot be gainsaid, that the rising wetness has been traced to the astonishing height of thirty-two feet. Only consider what a train of disasters might follow such a state of things as a house built upon a damp soaking site, constructed of porous materials, with the water uncheckmated in its progress upwards, and not only this, but totally unprotected from the *driviug*, as well as the *rising* wet. The *Nemesis* of such carelessness would be best traced in the blear-eyed and rheumatic ailing inmates, the miasmatic condition of the surroundings, and the dilapidated condition of the dwelling generally. . . . .

The first proposition I can recollect made as being remedial against damp was the using of enamelled bricks, and the making of the joints with a composition of melted bitumen and fine sand or powdered grit. The bottom courses, including the footings, were to be built up in this way to the ground level,—rather an expensive preventive, it must be confessed. About four years afterwards, or in 1868, a Manchester gentleman proposed to manufacture bricks by combining asphalte with sand, and cementing them together by the medium of molten asphalte, or other bituminous material. A simpler proposal, and one easier carried out, was the one known as Hutchinson's, and consisted in coating half the length of the headers or bonding bricks of a wall with asphalte. . . . .

A French system of preventing damp from affecting the inside of walls was, by coating thin veneers of wood with paint, and fixing a sheet of glass upon them, making the whole to adhere upon the interior walls by the aid of linseed oil and litharge, or by means of plaster. A German treatment, similar to this, was the fixing of a sheet of glass by cement against the interior walls all round the building. Both ideas fell still-born upon the English market. Attempts like these for curing damp would be somewhat analagous to driving the *Cimex lectularius*, with some half-and-half insecticide, into the chinks of the walls, and trying to shut him up there by passing over his retreat a sheet or two of thinnish paper.

In order to prevent the attraction of water from the ground upwards, recourse has been had to what is generally called damp proofing. Scores on scores of concretionary mixtures have been brought out in America, for this and for roof coverings, and the publication of a perfect cure of this kind is as common as the irrepressilbe peat machine which is to make every adopter's fortune. A system projected, nine years ago, in this country was the evaporation of chalk, sand, slate, &c., and the subsequent grinding of them to powder. Melted bitumen was added to the powders, until the proper consistency was reached, and this mixture was payed over the walls, or compressed into a damp tile, and built in the wall. In 1863 was introduced to notice a damp preventive, made up of argillaceous

earth, run into a paste with oilcake, hair, &c., ashes or soot, and about an eighth part of cement. The inventor claimed for this material, when applied to foundations, hardness and impermeabless to moisture, and also a considerable amount of incombustibility.

An effectual system of preventing the upwards attraction of damp in walls is either to cover them under the floor line with a coat or two of asphalte or pitch; or one can bed the wall over with two or three courses of slates laid in the best cement. This last is the handiest system, and is the one generally adopted by builders, who have always a stock of broken slates at their command. I may even go so far as to recommend this treatment to all buildings where a symmetrical damp course showing through the wall is not a desideratum.

A well known manner of protecting the walls from underground damp is by the adoption of what are called dry areas. These are constructed by leaving a space between the main wall and a thin supplementary wall outside, which goes up to the ground level, and are occasionally joined together with a stretching brick.

The commonest mode of avoiding the effects of drifting wet, or remedying the over-porous nature of the wall material, is to slate or tile the walls or gables,—although this is not altogether satisfactory, and, moreover, destroys the beauty of the elevation. Use hard impervious materials, if you can, of course; but if you cannot do so, or unfortunately have not done so, proceed to render the outside of the walls waterproof. This can be done in several ways. The home-brewed cure of the Americans for soft-bricked water-secreting walls, is to rub the surface down with bricks and cement water, and when all is smooth and the interstices well filled up, to paint the whole over. A similar treatment is observed in this country. A process described at a meeting of architects was the dissolution of ¾ lb. of mottled soap in one gallon of boiling water, and spreading this, in dry weather, flatly over the brick surface, and so as not to lather; and after drying for 24 hours, applying in the same manner a solution of ¼ lb. alum melted in two gallons of water. The soap and alum decompose each other, and form an impenetrable varnish. Another process was the application, with a brush, of sulphurized oil, made by subjecting 8 parts of linseed oil and 1 part of sulphur to 278 degrees of heat, in an iron vessel.

Every one cannot, however, make up his own medicines, and must, therefore, buy them ready prepared. Hence compositions have often been introduced to notice. I will, by way of conclusion, mention two or three in which I have every faith, and which I have carefully watched.

One is the Encaustic Zopissa treatment of Szerelemy and Co., of 551 Oxford Street, London; which is the filling up of the pores of the stones or brick with a solution, which is laid on in two different coats with an ordinary painter's brush. It indurates or case-hardens the walls, if the expression is allowable, and enables the stone or

brick to resist the chemical action of any atmosphere. The "No. 1 Liquid" is a colourless solution, impervious to rain and damp; the "Composition No. 2" is a substitute for oil paints, one hundredweight of which will thrice coat 125 square yards of wall. The other system is that of Gay and Co., of Alton, Hants, and consists of the application to the walls of their "Impenetrable Solution." This material is, like the last-named, a body-paint, and it can be had in any of the architectural tints or colours. One gallon will cover about 20 square yards of three coat-work. The petrifying liquid of the Sillicate Paint Company of Liverpool, containing as it does when dry, 90 per cent of silica, is also highly spoken of as a waterproofing solution. I recommend my readers to try these in preference to any of the expensive paints. There are several precautions which require to be observed in the use of these new processes; but if the simple rules sent out with the paints are adhered to, the results will be good.—*Wm. Eassie, C. E., in 'Healthy Houses.'*

MISS LANKESTER ON THE ADVANTAGES OF HEALTH LESSONS.

A paper by this estimable lady, Miss Lankester, Secretary to the National Health Society of Great Britain, was read not long ago at the Social Science Congress, on the advantages of health lessons to the poor. Below we give a brief extract from it and we hope it will be read carefully by every reader of this JOURNAL and that such an influence will be exerted as shall ere long cause every child to be taught, and early impressed with the importance of, the laws of health. Miss Lankaster said:

"Before we can hope to see laws which relate to the health of the community fully effective we must get those whom they affect to understand them, and to have some sort of intelligent appreciation of the principles they involve. Every man can see that if he persists in walking over the edge of a precipice he will in all probability be killed, and there is no need to enforce a law to prevent his doing so; but he does not see as clearly that if he and his family live and sleep in an atmosphere filled with sewer gas, or if they drink the unfiltered water of some dirty pool or river, destruction is as certain and inevitable, though by a slower process! Is it not clearly, then, the duty of those whose eyes are open to the latter dangers to make them evident, if possible, to those whose ignorance is as a mist before their vision? There are many ways of opening the eyes of people to the importance and value of these matters. In the education of the young, until lately, all practical subjects have been greatly neglected. Reading and writing are but the instruments of education, and are useful only as they bring other information and ideas into a child's mind. In themselves they are not education, and it is a grave question and one deserving serious consideration now that

every child is to be taught something. What shall we teach? In this section of the Social Science Congress the importance of teaching children and young people something of the nature of their own bodies, and of the laws which must be observed to keep those bodies in health, has been insisted on for many years—long ago, as many of us remember with regret, by the well-known advocates of sanitary education now passed away, the Rev. Charles Kingsley and Dr. Edwin Lankester. Surely the recollection of their words and writings must remain with us and stimulate those who loved them in life to follow in the course pointed out and pursued by them—a noble warfare with disease and death in every form. To improve the physical condition of a people is a grand and worthy object for a government, a society, or an individual effort. The public health is the public weal, and he who by any means in his power can improve the sanitary condition of a community, is serving his day and generation. Early lessons and first impressions are those which take deepest root in the mind, and it is much easier to instil the truth into the unprejudiced brain of a child, than to root out old superstitions, and supplant them with fresh ideas in the intelligence or unintelligence of the grown-up man or woman. The task of teaching the simple laws of life to a child is by no means a hard or disagreeable one, and it is surprising how readily all facts relating to the external world are received and understood by children. It is very desirable that teaching in the elementary facts of the nature and functions of the human body should be made compulsory in all our national schools, and not, as it now is, in a great measure voluntary. Such lessons well learnt and intelligently explained, as the constitution of a human body, its requirements in the way of air, food, exercise, and rest, its predisposition to injury and disease, and the means of avoiding these, must surely bear fruit in the physical improvement of a future generation if not in the present, and it is with the view of preparing the people for the adoption of laws made by those wiser than themselves, that we advocate the teaching of the facts of life to children in our schools. The laws can compel our towns to have a due supply of water, but no law can compel people to use that water. And if they do not know the injury and discomfort and unhealthiness of dirt in their houses and on their skins, the chances are they will not use it.

A Reduced Death-rate.—Dr. Taylerson, Medical Officer of Health for Whitby, on presenting his report on the health of the district for the past quarter to his Board, said he had been asked by the Registrar-General how he accounted for the great decrease in the death-rate of the town of late years. He had replied that it was not owing to the carrying out of any elaborate and costly system of drainage, but was consequent on the almost unlimited supply of pure water, supplied by the Whitby Waterworks Company, and the greater cleanliness of the people.—*Sanit. Rec.*

THE EXTENSION OF THE PLAGUE.

Our recent English medical exchanges mention, with undisguised apprehension, the fact that already early this spring authentic observers stat that the plague has broken out in Bagdad, and is rapidly increasing there; and information from other sources renders it probable that the disease has shown itself in other places in the vicinity of that city, some of which have not suffered before since the new development of the disease in Mesapotamia, three or four years ago. The progress of the epidemic in and about Bagdad last year shows that each year since its reappearance in that district it has covered a wider area, and it will be remembered that last year it crossed the Turco-Persian frontier, and broke out at Shuster, in Khuzistan. From the phenomena of the epidemic to this period it was feared, especially by the physicians on the spot, that, if it should recur in the present year, it must be expected to extend over a still wider area, and show itself in even a more aggravaated form than had yet been observed. The opinion is concurred in by Surgeon-Major Colvill, the medical officer attached to the British Embassy at Bagdad, and is expressed in his official report on the subject of the last and previous year's outbreak.

The Turco-Russian struggle in Asia Minor, and the massing of Persian troops on the western frontier of that country, add an additional and most grave factor to this ominous intelligence.

It has been so long since Christian Europe has suffered from this terrible disease that most medical men have never seen a case, and, indeed, for a while, epidemiologists flattered themselves it had 'died out.' They yet say that a thorough system of sanitation will certainly check its advance.

Let us hope so; for of all pestilences which have ever scourged humanity, and desolated empires, none approach in magnitude those of the plague. Under the name of "the black death," it fills, as Hirsch remarks, one of the darkest pages in the history of the human race. It devastated every known country of the earth, and penetrated to the remotest mountain hamlets and granges, sometimes sweeping away, in a few days, every inhabitant, leaving not one to remember the name, or to inherit the goods of the family, or the village. Long years afterward, travelers would come upon these unknown villages, the houses rotting, the bones of the plague-stricken owners bleaching in the rooms and streets, and no one to say who they had been.

As an epidemic disease, it no doubt spreads from India, that mother of pestilences, where, in the province of Kutch and Guzerat, it is found as an endemic of great malignancy. Far more fatal in its historical appearances than the cholera, it is well that the medical mind of Europe is on the alert to meet its approach with the most energetic measures; and should they fail, it will devolve upon us to lose no time in taking up the defensive, in the most energetic manner.—*Med. and Surg. Reporter*, Phila., June 9, 1877.

THE LATE EPIDEMIC OF MEASLES IN FIJI—HOW DISEASE IS SPREAD.

At a meeting of the Epidemiological Society, held in London, in January, Dr. Squire read a report from official sources on the very fatal epidemic of measles in Fiji. On January 12, 1875, soon after Fiji was placed under our Colonial Government, the Chief Thacombau returned in H. M. S. *Dido* from Sydney. He or some of his party had measles there. On the voyage home one of his sons and a native servant fell ill with the disease on January 6; they were treated in a house built for them on the ships deck, and made so favourable a recovery that no obstacle was raised to their landing on the 12th. Two or three days after landing, another of the Chief's sons, who had returned with him, was ill with measles. At this time visitors thronged the house where he was sick, but new cases in the native village had not attracted attention on January 24 and 25, when many of the native chiefs, some from great distances, assembled there. A strong force of the native constabulary attended. On February 12 a despatch from Mr. Layard announced measles to be epidemic among the native people, and that nearly one hundred of the native constables were down with it. It is evident that no alarm had been felt up to February 7, or return labourers would not then have been sent from Levuka to Malicolo, carrying the disease with them. We then hear of the death of a most influential chief who had promoted the great gathering, and of the rapid spread of the disease by all who attended the meeting. On February 25 some quarantine regulations were proclaimed to prevent the spread of the disease to other islands, to stay its progress in these seemed to be impossible. On March 3, Mr. Layard writes: "The attacks have been so sudden and complete that every soul in a village will be down at once, and no one able to procure food or to prepare it." The disease was carried everywhere by the latter end of March or beginning of April; from that time it gradually decreased. A census of population in three districts, taken before the measles, and afterwards in June, gives in Ovalan 1546 before, 1099 after, deaths 447; Koro, 2543 before, 1855 after, deaths 688: Ba, 7925 before, 5711 after, deaths 2214. From other islands 1637 deaths had been returned from measles. The disease is supposed to have caused more than 20,000 deaths, with an estimated loss of from one-fifth to one-fourth of the population. The favourable progress of the early native cases negatives the idea of any special proclivity. Dr. Cruikshank, who treated 143 of the native constables reports nine deaths, most of these resulting from evasion of needful precautions. Later in the epidemic, when it is said to be like plague, and that the people, seized with fear, had abandoned their sick—some dying in such close huts that the walls had to be destroyed to let the trade wind purify the air,—only one death occurred among a number of cases treated in separate rooms with fair attention. Fear added to the effects of disease. In one place twenty-six deaths are said to have

occurred within forty-eight hours of the seizure. The weather was unfavourable; for though the mean temperature was 80°, with a daily range of only 15°, except on the hills, tropical rains followed the hurricanes, and in March fifty inches fell in twenty-seven days. It rained during 204 hours. The people choose swampy sites for their dwellings; and whether they kept close shut in huts without ventilation, or rushed into the streams and remained in the water during the height of the illness, the consequences were equally fatal. The excessive mortality resulted from terror at the mysterious seizure and the want of commonest aids during illness. There were none to offer drink during the fever, nor food on its subsidence. Thousands were carried off by want of nourishment and care, as well as by dysentery and congestion of the lungs. The worst dangers from crowding were incurred in the small houses, and the worst dangers from cold by the sufferers rushing to the water, where they would continue immersed. Measles in those islands, in 20° S. latitude or within the tropics, corresponds very closely to the facts recorded of measles in the Faroe Islands, in 70° N. latitude, or near the polar circle. The epidemic ceased only when every person had been attacked. All the innate dangers of the disease here revealed differ only in degree, and not in kind, from those which are so commonly guarded against among ourselves by simple nursing. We need invoke no special susceptibility of race or peculiarity of constitution to explain the great mortality. Among people closely related to us a similar fatality from measles has occurred. During the last civil war in the United States, among the new levies, the number attacked with measles exceeded 38,000, and the mortality attributable to this disease in two large hospitals was over 20 per cent. This rate of mortality was doubled among the Garde-Mobile in the month of January, 1871, during the siege of Paris, when of 215 cases of measles eighty-six died, or exactly 40 per cent., the proportional mortality from measles exceeding that from small-pox.—*Medical Times and Gazette.*

TREATMENT OF OPIUM POISONING.—A case is reported, taken from an Italian journal, of a woman who swallowed a large quantity of muriate of morphia, and whose life was despaired of, after the failure of all ordinary means of relief. She seemed about to die when a drachm or more of spirit of ammonia was injected into her stomach. 'Immediately the woman regained her senses, and in a short time recovered completely.' We believe the secret of this and many other similar recoveries from the effects of opium, consists in the fact that, in a large number of instances, persons deeply narcotized by the drug will recover spontaneously, even after sinking almost into death; just as men recover from alcohol poisoning, or from 'a dead drunk,' when left to themselves.—*Pacific Med. & Surgical Journal.*

EFFECT OF SUN-LIGHT UPON HEALTH.—In our last issue we drew attention to an interesting lecture by Mr. Thistleton Dyer on "Plant Growths," in which he said that light (through the medium of its blue rays) had a repressive action upon the growth of plants, that plants grew faster by night than by day, that plants grown in the dark were said to be 'drawn,' or grew taller because they were removed from the repressive action of light, and that the movement of plants towards the light was probably due to the curvature of the stems, in consequence of the illuminated side growing more slowly than the one that was shaded. Should the truth of this statement be confirmed by other observers it will be an interesting speculation whether the same facts hold good with respect to the human frame. But whatever influence sun-light may have upon the growth of the human body, its beneficial influence upon the health is well-known, although too frequently lost sight of. The late Mr. N. B. Ward, a medical man who had given much attention to the influence of air and light upon the growth of animals and plants, insists strongly upon the necessity of sun-light to the health and existence of children. In his evidence, observes Dr. John Liddle, before a Government commission, Mr. Ward stated that, as a result of his experience, the influence of light is a matter of the highest importance to the proper physical developement of the human species, that the amount of disease among persons occupying light rooms is infinitely less than as compared with that among the occupants of dark rooms, and that the influence of light, especially solar light, in preventing the fatal termination of disease is a fact well known to him.—*Med. Press & Circular.*

CLEANSING AND DISINFECTING.—There seems much reason to fear that too little attention has been bestowed on the important question, 'What becomes of germs of disease after a cleansing process?' Filth is washed away, but where? If water holding the poison in suspension is thrown into ordinary drains it will become the agent for distributing disease. This is a very grave consideration. Disinfecting, properly so called, is not a precaution commonly carried out. It is generally deemed sufficient to purify the particular articles supposed to be foul, without regard to what the destination of the germs removed may be. It is even doubtful whether this practical point receives a due share of thought in public institutions. Certainly there is room for improvement in the domestic and laundry methods of 'purification.' The only effectual measure for arresting the spread of infection is one which destroys the vitality of the germ where it is found. We shall never be safe until a process of this nature forms part of the usual proceeding for cleansing articles of clothing and bedding in use in private families and at hospitals. To strike at the root of the danger the means needful for the extinction of vitality in morbific organisms must be invariably employed.—*Lancet.*

A HINT TO CIGAR SMOKERS.—Some smokers puncture the end of the cigar previous to lighting it; some bite off the end; others cut it smoothly with a knife. The latter is preferable, as may be judged from the case of a girl reported in the *Lancet*. She had an ugly chancre on her lip. Independent of the question as to how she became possessed of the sore, the interest of the case (and a melancholy one it is for smokers) centres in the occupation by means of which the girl got her living, for she had been pursuing it for a period of three weeks with this sore on her lip. She was employed in a cigar manufactory, where her work consisted in rolling the outer leaf round the bulk of the cigar, and when she came to finish off the end, which is put into the mouth, the custom was to bite the superfluous material off with her teeth, making the ends to "stick with a lick." The girl naively supposed that some poison had got from the tobacco into a small crack of the lip. But how much poison is it possible got from the lip among the tobacco? She estimated the number of cigars completed in one day at twenty dozen!—*Med. and Surg. Reporter.*

THE PRESERVATION OF MILK.—According to Professor Caldwell, of Cornell University, U. S. A., boracic acid is the best antiseptic he had found for preserving milk, or keeping it sound for an unusual length of time. When the temperature was 80° Fahr. and milk soured in from twenty to twenty-two hours, 1 part of boracic acid, added to 1,000 parts of milk by weight, kept it sweet for the space of fifty hours, when the temperature was 72° Fahr. When applied to milk warm from the cow, it kept sweet and sound twice as long as milk not treated with it. No injury obtains to the milk in using 1 part of boracic acid for 2,000 parts of milk. Boracic acid, he stated, was not poisonous. He had partaken of milk thus preserved, and no harm resulted from the taking of such milk into the stomach. Borax is the principal ingredient in the antiseptic milk powders sold in England, and it is frequently used by some of our metropolitan milk venders in the preservation of milk consigned to them from distant country farms.—*Sanitary Record.*

EXTRACTING FOREIGN BODIES FROM THE ŒSOPHAGUS.—Dr. Edmond Le Bele proposes the following means by which, on two occasions, in the same individual, he extracted large bones from the œsophagus: A piece of iron wire, of medium thickness and about two feet in length, is bent on itself in the middle so as to form a small loop, in the form of a crotchet, the size and shape of which will correspond to the form and volume of the foreign body; the extremity, which rests in the hand of the operator, is likewise bent in such a manner that traction can be exerted; finally, the whole wire is bent so as to correspond to the bucco-pharyngeal curve. The patient being placed in a convenient position, the head is fixed by the left hand of the surgeon, while the right introduces the wire into the

œsophagus, keeping it along the posterior wall until it reaches the foreign body, when the movement of deglutition by the patient will often suffice to place the crochet on the inferior surface of the foreign body, As the metalic wire does not take up much room in the patient's throat, it impedes the breathing less than the bulky instruments usually employed, which may also injure the epiglottis.—*Rev. de Thérap—N. Y. Med. Journal.*

In allusion to a case in which there had been some difficulty in extracting a coin swallowed by a child, Dr. Thouvenin states that in such cases he adopts a very simple measure with great success. It consists in laying the child on his belly on a table, with his head, supported by an assistant, projecting beyond it. The finger is then introduced into the mouth in order to compress the tongue, and the coin slides out along the finger of the operater.—*Bull de Thérap.*

DRINKING AT MEALS.—The universal custom of drinking large quantities of fluid with meals is productive of no small injury to the digestive organs. It encourages rapid eating, which, again, occasions overeating. Thus the food is not properly salivated, and is washed down into the stomach without being sufficiently masticated.

Fluids, taken in excess, with food, do further mischief; they dilute the gastric juice, thus rendering it incapable of acting upon the elements of the food. Before the digestive process can begin, the fluids must be absorbed; and this unnatural task delays digestion, and weakens the digestive organs.—*Health Reformer.*

SCHOOL HYGIENE.—The Medico-Legal Society of New York adopted recommendations of their Committee on School Hygiene as follows:—That the minimum age of admission to public schools be six years, instead of four; that the maximum attendance at school for children under eight years of age be made three hours per day, with suitable intermission; that provision be made by law for medical inspection and supervision of schools, to secure the enforcement of sanitary laws; that large play-grounds should be furnished for the children; and that the schools should be built where adequate space is to be had to ensure light, ventilation, and play ground. —*Canada Lancet.*

STIMULANTS USED BY THE RACE.—It is estimated that coffee, both beans and leaves, is drunk by sixty millions of the human family. Tea of all kinds is used by five hundred millions, and opium by four hundred millions; alcohol, in its various forms, by five hundred millions of the human race. Tobacco is probable used by seven or eight hundred millions. These startling facts indicate a large proportion of the race using some substances that are either stimulants or narcotics. The work of the physiologist, in the future, will be to determine the true place in nature of these substances, and indicate where their use ends and abuse begins.—*Med. & Surgical Reporter.*

THE RELATIONS OF SEWER GASES TO TYPHOID FEVER.—An English contemporary remarks :—The recent epidemic of Typhoid in Paris, like the epidemics of 1865 and 1872, specially selected particular districts, streets and houses. It, for example, particularly raged in the *quartier St. Laurent*, and in the great barracks of Saint-Eugène, where the malady became so general and so fatal that they had to be evacuated by the troops. Draw a plan of the sewers of Paris, and you draw a map of the topography of typhoid fever in the past and latest epidemics. The great central sewer—the Cloaca Maxima—of Paris, the length of which is 6,329 metres traverses the *quartier Saint-Laurent* from east to west, passes under the Saint-Eugène barracks, receives the Asnières sewer into the Rue de Château d'Eau, and proceeds onwards to the Champs Elysées, permeating, by house-drains and otherwise, streets and dwellings with its gaseous emanations charged with typhoid contagium.—*Med. Rep.*

SEWER GASES.—Professor Frankland has made another contribution to sanitary science by stating his conclusion, after repeated experiments, that sewage, in flowing through a sewer, however unpleasant the odour may be in the locality, cannot be sufficiently agitated to impregnate the circumambient air with suspended particles. But if sewage becomes stagnant, fermentation ensues, and the bursting of myriads of minute bubles throws into the air particles of zymotic matter. If, therefore, sewage is constantly passing at a fair rate through the sewers, the air therefrom will be comparatively harmless ; but if it be allowed to remain long enough to putrify, danger to health may arise.—*London Lancet.*

DRY DRESSING OF WOUNDS.—Mr. Robert Hamilton, of Leeds, has contributed an interesting paper to the *Lancet* (5th May) on the advantages of the 'anhydrous dressing of wounds,' in which he endeavous to show that water should not be permitted to come near any wound, and that the exclusion of this agent is the real cause of much of the success which has attended Lister's method.' Mr. Hamilton believes that in so far as we can keep an abraded surface free from external agencies, just so far shall we succeed in facilitating the healing process. He holds, too, that amongst the external agencies which are injurious water is worse than the atmosphere.—*The Doctor.*

CHOLERA INFANTUM.—There have been many views as to the cause of the excessive infant mortality from summer diarrhœa, viz., impure milk, water-logged subsoil, solar heat, and choked sewers. By experiments Baginsky shows that each of these causes are but separate factors contributing to a common result—rapid decomposition of the infant's food. Putrescent, or rotten, food is the real cause of cholera infantum.—*Dntroit Med. Jour.*

MANY have observed that children who begin to go to school at 10 or 12 often overtake and pass those who begin at four or five, by the time they are 17 or 18; and far surpass the others in the struggle which most must engage in during adult life. The country lad is also very apt, in this struggle, to get the better of the more precocious child of the city. A very large proportion of the most successful in business and public life were brought up in the country, and in childhood had their muscles more cultivated than their brains. The best thing a little child can do is to grow. Let it have an abundance of muscular exercise; let it have plain, unstimulating and nourishing food; let it, as a consequence, enjoy sound, refreshing sleep, thus acquiring a robust frame, and it will be far better fitted for the battle of life than the one who, as an infant prodigy of precocity, delighted the vanity of the parents.—*Dr. H. P. Galchel.*

SLEEPING WITH THE MOUTH OPEN.—Dr. Jackson says the cause in most cases proceeds from obstruction of the nasal air passages, by acute or chronic catarrh, owing to which it is not easy to breathe in the natural way; the mouth is opened for the better inhalation of air, and thus the habit is formed. In some instances, however, the cause is simply a habit which the person has fallen into carelessly, helped along, undoubtedly by a debilitated condition of the body. The cure for it consists in getting rid of the obstruction of the nasal passages, and the improvement of the general bodily health; but more particularly, I think, in the establishment of a right consciousness in regard to the matter. I have known of several instances where a cure was effected by bringing the will of the person to bear upon the habit. Fix your mind firmly and with determination upon this point, that you must keep your mouth shut when you go to sleep: have some person for awhile wake you up when your mouth drops open. In this way you will get control of the matter in a little while.—*Exchange.*

FUNERAL REFORM—The Northampton Ruri-Decanal Chapter have passed the following resolutions among others, with regard to funeral reform:—'1. That the members of this chapter pledge themselves to use every effort, by precept and example, to promote the decent and economical conduct of funerals. 2. That as a means to the above, this chapter agree to do all in its power to get the interval shortened between the death and burial of their parishoners, on sanitary as well as economical grounds. 3. That the chapter would discourage the use of brick graves and leaden coffins, and advocate the introduction everywhere of a parish pall or bier. 4. That this chapter recommends the formation of parochial associations to make arrangements for the reverent interment of the dead.'—*Sanitary Rec.*

IN DORSETSHIRE, as elsewhere, the rapid increase of insanity has lately been brought to notice. A magistrate, observed, if lunacy continued to increase as at present, the insane would be in the majority.

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ON THE AIR IN SOME OF THE TORONTO PUBLIC SCHOOLS.

The average period of the school life of boys and girls is probably the most susceptible of their existence,—they are then most susceptible to all external influences and impressions. It is therefore very important that the essentials of life by which they are surrounded at this period should receive special care and attention, if the men and women of the next generation are to be what they should. Repeatedly in this JOURNAL have efforts been made to awaken greater general interest in school hygiene. It will be readily admitted by every one that, when there is anything of the nature of compulsory attendance at schools the greatest care should be exercised that the construction and arrangements of the school buildings be such as not to be liable to affect prejudicially the health of those who assemble therein; and also that they shall not be exposed therein to the contagiums of infectious disease on the persons of any pupils who may be allowed to attend school while, or too soon after, recovering from such disease.

During last winter, when preparing a paper on 'The Air We Breath,' we took occasion to visit some of the public schools in Toronto. We had been led to believe that the air in many of them, from want of ventilation and from over-crowding, would not be found as pure as it should be, but we had not been prepared for meeting with such a foul, unmistakeable, concentrated odor of over-expired air as presented itself, as it were to escape from its own noxiousness, as we opened the door to enter the various rooms. On entering some of them from the outer air the odor was not only very offensive but positively insufferable. It will probably be asked, how did the children, and especially the teachers, endure this state of the atmosphere? A like question was put to the teachers. Some replied that it was unpleasant; some had endeavoured to remedy the evil by lowering or raising windows, but they said the pupils then complained

of draughts, and that little could be done in this way. It must be remembered that both teachers and pupils entered the rooms when the air in them was comparatively fresh, and the fouling process being gradual, the ultimate foul condition of the air was not nearly so perceptible to their sense of smell as to that of one entering from without. We learned that some of the teachers were in the habit of having the windows and doors of their apartments opened freely during the few minutes of intermission and at noon time, and thus changing the most of the air in the room.

Of all the rooms visited not one was provided with any means whatever, except the ordinary door and windows, (usually closed), for changing the air; with the two following exceptions: one in the case of a room in the ceiling of which was a large opening through which foul air could and did undoubtedly escape. But mark its next 'local habitation'; another occupied room immediately above. The other exception, this same room above, with the said opening in its floor, through which the heavier poisonous particles in the air could gradually subside into the room below. This wise provision for a kindly interchange of neighbouring gases was the only opening found in the walls, ceilings, or floors of any of the apartments through which air could pass.

Most of the rooms visited were heated with air-tight stoves, in connection with which, of course, there is an absolute want of ventilation.

The newer or recently built public schools in the city were not visited; we learn they are provided with means for ventilating.

One small room visited, heated by a small air-tight stove, contained on an average, the teacher stated, over forty pupils. This room was not large enough to allow each pupil a cubic space of 150 feet. The door and the windows were kept closed for the most part while the children were within. The teacher said the children complained of draughts when windows were open. They frequently suffered from 'colds.' This room contained a larger number of pupils in proportion to its size than any other room visited, though the difference in this respect between it and several others was not great.

It is not purposed to enter on the present occasion into details as regards the rate at which the process of respiration poisons the surrounding atmosphere. It will suffice to say that according to Parkes and other high authorities, a cubic space of at least

1000 cubic feet (representing a floor space nearly eight feet square in a room sixteen feet high) per head should be allowed in all cases, if possible; that health demands this in order to ventilate without giving rise to draughts, and this with provision for constant change of air, or means of ventilating. And that from 2000 to 3000 feet of fresh pure air per head per hour should be provided in order to keep the standard of purity safe; this requiring an inlet under ordinary conditions of the atmosphere of 24 square inches, with proportionate outlet. In cold or windy weather, the area of inlet and outlet required would be less.

In a girls' school with 150 cubic feet of space per head, Pattenkofer found no less than 7.23 parts of carbon dioxide (carbonic acid) per 1000, or ten times the amount the health standard permits. He does not say what means, if any, were employed for ventilating.

It may be observed here that the carbon dioxide, *per se*, is not now regarded as particularly injurious to health, but it is a reliable index to the amount of organic impurities in expired air, which are so well known to be poisonous, and which increase *pari passu* as the carbon dioxide increases.

The smallest amount of cubic space permitted in any country where any supervision is exercised, as regards schools, prisons, barracks, &c., so far as we can learn, is at least about 300 cubic feet per head; and this with special means for ventilating. Parkes, the best authority, says, "In the case of soldiers, [Great Britain], the amount of authorised regulation space (600 cubic feet) is below the standard now given; that is, 1000 or 1200 cubic feet, by the best authorities." Again he says as regards children, as they undergo, in proportion to their size, "a more rapid tissue change than adults, it would be the safest course to have the same rule for all individuals of whatever age, except the very youngest and oldest.

With a limited cubic space, it is almost impossible to ventilate without producing draughts, except with very expensive apparatus. With a limited cubic space and no provision for ventilation, no inlets or outlets for air, while there will not be draughts, the air will quickly become foul. With a cubic space of only 150 feet as in the room mentioned, and no provision for change, fresh air would be rendered utterly unfit for respiration in less than five minutes. What condition would it be expected to be in in one hour and a half?

With a fire burning in an open grate in a room with no special inlets, the air is so rapidly withdrawn from the room, especially in

cold weather, that considerable air is forced in through cracks and crevices about doors and windows. But the rooms herein referred to are not favored with grates. No doubt a good deal of air from the outside, even in these cases, found its way through such minute openings, or the occupants could hardly have survived the hour and a half of confinement therein. The teacher in the room mentioned as containing a larger proportionate number of pupils than any other visited, could not say that her book showed a larger number of her class absent on account of sickness, but they frequently suffered from 'colds.'

In view of these facts, chemical examination or testing of the air in the rooms should hardly be necessary to convince any one that such rooms were quite unfit for the purpose for which they were used. But a chemical examination of the air of four of the rooms was made, and the result showed very distinctly that the air in each of them contained carbon dixide at least considerably in excess of that given as the standard of permissible maximum impurity.

We do not know exactly who is responsible for the state of matters above referred to. But it is very essential that some means be used to remedy them during the present holidays, and that children in this city shall not again be exposed to such really terrible insanitary conditions. It is a positive crime to compel children to remain in such room under such conditions.

The remedies required then are, a greatly reduced number of pupils for each room; some special means for ventilation; and better provision for heating.

Annotations.

THE REGISTRATION OF DISEASES.

The registration of diseases, as well as of deaths, has been on several occasions advocated in this JOURNAL. At the last meeting of the British Medical Association, Dr. William Squire contributed an interesting paper on this subject. He remarks (*Practitioner*) that in the light of what has been accomplished in mortality registration, there is reason to predict that sanitary administration will find in the systematic registration of diseases immense assistance in promoting public health. Disease that does not directly lead to death yet often cripples development, destroys energy, or robs life of its joy and usefulness, would thus be met at its outset and be prevented, repelled

or defeated; for disease, not death, is the foe we are bound to oppose. A registration of all diseases is to be encouraged, the imposition of fines being restricted to those cases only in which it was found that infectious diseases had not been reported. Without compulsory powers it would be impossible to make any scheme thoroughly effective. In all cases the responsibility of reporting the existence of infection should rest with the parent or householder. The obligation resting on the physician should be not that of acting in any way as an informant, but only such as would compel a clear, plain, truthful certificate of illness when called upon. Householders apply to local authority to abate nuisances; they should report the ailments that befall their families. All acute diseases, all infectious diseases, all children's diseases, ought especially to be reported. The acute cases guide to where there is suffering, and where there is most need of health—often to the discovery of infectious illness of which it may be the local sign. The slightest cases of diseases must be known and attended to.

Any disease among children is likely to lead us to some of the causes deteriorating the general health, since children are the most sensitive to insanitary conditions. All the diseases we most wish to prevent are most active and fatal amongst children in the first five years of life; in the next five or ten years, the constitutional or developmental diseases show themselves. These might often be arrested; deficient air-space and much else might be remedied that leads to struma and disease of bones and joints, crippling growth and strength.

The great objection urged to the registration of disease is that it can never be perfectly exhaustive and must vary much in accuracy. The value of the work carried on at the Registrar-General's Department is dependent on its accuracy and completeness. The returns obtained are full and exhaustive for the whole country, and the powers of the government are exerted in their collection. What is necessarily omitted in such returns is more than compensated for by the element of certainty introduced. Without the patience, skill, and care devoted by Dr. William Farr to elicit the value of the facts thus collected, such great results would never have been obtained. This work has required the labor of a life to organize, assiduous and efficient assistance to maintain. Could we hope that the more numerous and less definite health-returns should be as successfully dealt with? Some such assurance is required; but let not the perfection of one system of registration deter or altogether prevent us from attempting another. Registration of sickness could never be perfect, but it has a function of its own in no way dependent on its embracing every form of disease. It would not be a substitute for the register of deaths; it would give useful warning beforehand; but it would only be of full use and value when taken in conjunction with the mortality return. The object is a different one, and our means may be modified towards its attachment.

Like testimony in reference to this matter was given by Dr. Alfred Carpenter in his address on Public Health before the British Medical Association last year, and by Dr. Francis Bond in an address before the British Social Science Association. In January of the present year, the Society of Medical Officers of Health, Great Britain, unanimously resolved 'that in the opinion of the society, whenever a case of infectious disease occurs in any house or vessel, it should be the duty of the person in charge of the house or vessel, or of the person in charge of the case, to report the fact to the sanitary authority without delay; and that it should be the duty of every medical practitioner in attendance upon any such case to give immediate information respecting its nature to the occupier or other person responsible for reporting it to the sanitary authority.'

HISTORY OF VITAL STATISTICS.

The following brief history of Registration of Deaths, chiefly from the last report of the State Board of Health, Massachusetts, will prove interesting to many:—

In considering how to avert the recurrence of the terrible plagues which visited London in the sixteenth century, the first step was to find where and under what circumstances people died, and how variously different localities were affected. For this purpose registration was organized, imperfect, it is true, but sufficient to give many important hints. Much later, when the Poor-Law Board was created, a better system of registration was adopted; but it was only in 1837 that it was carried out with all the force of an Act of Parliament, and with the coöperation of the physicians, surgeons and apothecaries promised by the presidents of their associations. The law has been improved from time to time by many amendments; and finally physicians were compelled to return certificates of death under penalty, in 1874, as was then already the law in Scotland.

To such a high degree of perfection has registration of deaths now arrived in England, that on each Tuesday a printed pamphlet of ten pages is prepared and sent over the kingdom, giving the causes of deaths, etc., with the conclusions and warnings to be drawn from them, *for the week ending the previous Saturday*, and collected from twenty-three towns, containing over eight million inhabitants. This return also contains the latest information from the large cities of the world,—from New York and Philadelphia to Calcutta and Bombay,—and fully justifies Dr. Farr's enthusiastic remark, that 'Thus observers, like watchmen on the walls, are ever on the lookout, so that they see exactly what is going on, and neither plague, cholera, nor any other great epidemic can take the nation by surprise.' Quarterly, yearly and decennial reports are also published. Registration in Massachusetts followed four years after (1841.)

The Imperial Board of Health of Germany have taken steps to collect and publish similar returns *promptly* from all cities in the empire containing 15,000 inhabitants and over, especially with reference to getting early information in regard to epidemics.

The first act on Registration of vital statistics in Ontario, and we believe in Canada, was passed in July 1869. The act originated it appears with Mr. (now Honourable) T. B. Pardee, under the Sandfield McDonald Government. The present act, 'To provide for the Registration of Births, Marriages and Deaths,' that of the Honourable S. C. Wood, came into force on the 1st January, 1876. There is evidence that it works very effectively and with fair approach to completeness, considering the short time it has been in operation.

In Nova Scotia there has been an act for the registration of vital statistics in force for some years. The returns there however are not yet very complete it appears.

THE WORK OF THE ONTARIO MEDICAL COUNCIL.

At the regular meeting, July 3rd to 5th, of the above council, sanitary or public health matters received a fair share of attention, and we congratulate the council in that they so far raised the standard of medical education in Ontario, as to require students in the future to attend a course of lectures on sanitary science. The matter was first moved in, we believe, by Dr. Brouse, M. P. The following was adopted, 'That attendance at a course of 25 lectures on Sanitary Science shall be required of every student, except such as have already attended two winter courses of lectures.'

In reference to alcoholic beverages, upon a movement by Dr. Grant, of Ottawa, the following was passed :—'That this Council feels that the excessive use of alcoholic beverages is decidedly on the increase in our midst, and, as the representatives of the profession in Ontario, we beg to assure the public that it shall be our constant endeavour on all occasions, by our exhortations and scientific explanations of the danger of such excess, to suppress it to the utmost by our united and collective influence.'

In order to strengthen if possible the hands of Dr. Brouse in his movement for a Sanitary Bureau, it was moved by Dr. Berryman and seconded by Dr. Wm. Clarke, and carried :—'That this Council has watched with great interest the active efforts put forth by Dr. W. H. Brouse from his seat in the House of the Dominion Parliament in connection with the organization of a bureau of statistics—we cannot too strongly urge on the Government the importance of this enquiry—all important to the public at large, and the medical profession, from a sanitary and hygienic point of view, and to the Government especially for internal statistical purposes or national polity; we trust he may not flag in his onerous but important work.'

DIPHTHERIA.

In investigating the nature and causes of an epidemic of diphtheria which visited Lynn, Mass. U. S., last year, with such fatal violence, the following conclusions were arrived at:

1. Diphtheria has been more prevalent near marsh lands, in the valleys of brooks, and near bodies of water where the soil and subsoil are naturally damp, than at a distance from such localities.

2. It has been most prevalent and least fatal in autumn, least prevalent and most fatal in spring; but there appears to have been no constant relation between the character of the weather and either the prevalence or fatality of the disease.

3. Other things being equal, it has been more prevalent and relatively more fatal where air and soil have been polluted by house-drainage, overflowing privies, decaying garbage, etc., than in places not subject to these conditions.

4. It has presented in an eminent degree the characteristics of a contageous disease.

5. Owing probably to its contageous nature, it has occurred on all kinds of soil, at all seasons of the year, under every variety of hygienic conditions.

SANITARY OR MEDICAL INSPECTION OF SCHOOLS.

Attention is being drawn to this question in Great Britain and the United States. Special oversight by a competent medical man as to the sanitary condition of schools is of great importance. General attention is given at the present time almost entirely to the mental progress of the pupils to the sad neglect, in too many cases, of their physical development and health.

Under the term 'the sanitary condition of a school' there are included such details as ventilation, warming, the prevention of overcrowding, the purity and abundance of the water-supply, the efficiency of the drains, the supply of closets, and the general suitability of the building for its purpose.

But the strongest argument in favour of a regular medical inspection of schools is, says the *Sanitary Record*, that a very large amount of infectious diseases at present spread at and through schools would be thereby prevented.

In reference to this subject is the following from a Boston exchange:—'We have watched with much interest the measures taken by our city school board with reference to the appointment of a medical inspector for the public schools, and we confess a feeling of disappointment that so little fruit has developed as yet in fulfilment of the project. In our view, the arguments in favour of systematic medical superintendence of the schools of a great city are convincing; and our hope has been that the city of Boston would set an early and positive example in this as in other good municipal works.

Fully convinced of the need which exists for the appointment of a properly trained medical school inspector, who shall give his entire attention to the various duties which his office would impose, we trust the subject will not be permitted to pass out of sight in the councils of our reorganized school board.'

LECTURES ON THE LAWS OF HEALTH.—A course of twelve lectures on the Laws of Health was delivered by Dr. Corfield, Professor of Hygiene and Public Health in University College, London, at the Society of Arts during the winter. A preliminary course on Physiology by the same lecturer was also delivered. The following are the subjects of the lectures :—1. Personal Health; Explanation of Constitution; Temperament; Idiosyncrasy; the various periods of Life; Diseases belonging to each Period; Precautions to be adopted during Infancy. 2. Feb. 1st—The periods of Life, continued; Special Precautions during Youth, Manhood, and Old Age; Hereditary Diseases; great importance of knowledge about them; Care of persons recovering from Fevers, etc.; Use of baths, exercise, etc.; Occupations. 3. Feb. 10th.—The air we breathe: its Composition and physical properties; Variations in the Composition of the Air, produced by Animals and plants; Quantity of Air required by each Person; Results of breathing Air which has been breathed before; Overcrowding. 4. February 17th.—Warming and lighting of houses; Impurities introduced into the Air by Fires and Lights; Gas, and the products of its Combustion; Dust in the Air; Unhealthy employments. 5. February 24th.—Ventilation; Principles to be followed; Simplest method of Ventilating Rooms and Houses; Artificial Ventilation of large buildings. 6. March 1st (Thursday). Foods; Classes of Food Substances; How each is disposed of in the Economy; Quantity of Food required; Milk the only perfect Food. 7. March 10th.—Animal Foods; Vegetable Foods; Bread, etc.; Alcoholic drinks; Tea, Coffee, etc.; Digestibility of different Foods; Arrangement of Meals. 8. March 17th.—Water; its Sources, Qualities, Distribution, Cisterns. etc.; Cholera, Typhoid Fever, etc., caused by drinking Impure Water; Use of Filters. 9. March 24th.—Damp and Dry Soils; Consumption, Ague, Rhumatism, etc.; Drainage, choice of a place to live in. 10. April 14th.—Sanitary arrangements in Houses; Sewers, Drains, etc.; Disposal of Refuse Matters; Sewage Farms, etc. 11. April 21st.—Small-pox; Vaccination and Revaccination. 12. April 28th.—Prevention of Scarlet Fever; Typhus; Enteric or Typoid Fever, etc.; Disinfection.

HEALTH BOARDS.—The people of the State of Michigan enact, 1. In every township the township board shall be the board of health. The supervisor shall be the president, and the township clerk shall be the clerk of said board. The clerk shall keep a record of the proceedings of the board in a book to be provided for that purpose at the expense of the township. 2. Every township board

of health shall appoint and constantly have a health officer of the township who shall where practicable, be a physician and sanitary adviser, and an executive officer of the board: *Provided*, That in townships where it is not practicable to secure the services of a well educated and suitable physician, the board may appoint the supervisor or some other person as such health officer. The board of health shall establish his salary or other compensation, and shall regulate and audit all fees and charges of persons employed by them in the execution of the health laws and of their own regulations. Within thirty days after the annual township meeting in each year, the board of health shall meet for the transaction of business and shall appoint or reappoint a health officer, and shall immediately cause to be transmitted to the Secretary of the State Board of Health, at Lansing, the full name and post-office address of such health officer, and a statement whether he is a physician, the supervisor, or some other person not a physician. A special meeting of the Board may be called by the order of the president or of any two members of said board.

PORTABLE DISINFECTING CHEST.—At the meeting of the British Medical Association at Sheffield in August last, Dr. Charles Rogers of East Retford, Notts, exhibited a portable disinfecting chest. It consists of a wooden box, by which clothing, etc., can be brought from the sick room; a hot air disinfecting chest; fireplace, which may be constructed to burn gas or ordinary fuel; fresh air valve, by which noxious vapors, etc., may be forced into the chimney; and a thermometer. It contains an outer and inner casing of iron, round the bottom and four sides of which runs the flue. The fire-box is made removable when the required temperature, 220 to 240 deg. is reached, which is readily recognized by the thermometer, which is graduated up to 300° Fahr. So soon as the above temperature is obtained, the fire is removed and a throttle-valve turned on in the flue, so as to prevent the heat from escaping. It can be taken to the house where contagious disease exists, and can there be put in operation, or the infected clothing can be removed in the box, if the apparatus be stationary. The cost is from 10*l.* to 30*l.*, stg.

QUACK MEDICINES.—These, for the most part poisons, are sold in almost as many places as alcoholic beverages, and it is high time some measures were adopted to restrict their sale. Prohibition is at least as much needed in respect to these as to alcoholic drinks. The use of the former is probably as great an evil, in a physical sense, as that of the latter. A writer in the *Boston Medical and Surgical Journal* gives the following in reference to the first named:—These medicines are swallowed and applied to an extent fearful to contemplate, in view of their contents. Some contain narcotics, notably those prepared for childhood and infancy; some contain poisonous elements, destructive to tissue by continuous use; and some contain alcohol in large proportions; three powerful agents for good when rightly ap-

plied, or potent for distruction when used indiscriminately. . . . At the threshold of life, 'soothing syrups' and 'pain killers,' in the hands of careless mothers and nurses, are proving the American Ganges to the infancy of this generation. Nor is the curse limited to this class of our population. These narcotics, with 'balsams, bitters, hair-restorers,' and their like, are depraving taste and inciting functional and organic lesions among all classes to an alarming extent.

VITAL STATISTICS IN CANADIAN CITIES.—In the June number of this JOURNAL were given the returns from the chief cities in Ontario for the first quarter of this year. Below are the returns for the second quarter—April, May, June:—

TORONTO.—Marriages 146; Births, 557; Deaths, 414 (for the half year, Births, 1073; Marriages, 398; Deaths, 785.) Diseases of the Lung, (Pneumonia, Bronchitis, Congestion, Consumption), Second Quarter—106; Scarlet fever, 37; Typhoid Fever, 5; Diphtheria, 5.

HAMILTON.—Second Quarter—Marriages, 47: Births, 226; Deaths, 155.

LONDON.—Second Quarter—Marriages, 57; Births, 103; Deaths, 68.

KINGSTON.—Second Quarter—Births, 65: Marriages, 51; Deaths, 54.

BRANTFORD.—Half year—Births, 66; Marriages, 23; Deaths, 33.

ST. CATHARINES.—Half year—Births, 63: Marriages, 76; Deaths, 90.

The number of interments in the four cemeteries adjacent to this city during the half year ending June 30, was 858. Taking into consideration the number of deaths which take place in Yorkville and city suburbs, the interments connected with which would be for the most part in the cemeteries, but which would not be registered in Toronto, the returns of deaths for Toronto, 785, must be tolerably complete.

THE ROCHDALE PAIL SYSTEM.—The Medical Health Officer of Rochdale writes to the *Sanitary Record*, that for the year ending March 31 last, the death-rate was equal to an annual rate of 22·4 per 1,000; the average of the three previous years was 23.1, and of the previous six years 23·5. This continued decline in the death-rate, he says, is unmistakably due in a large measure to the introduction and constantly increasing alteration of old privies to the pail system. As the fundamental principles of that system are to prevent both saturation of the soil and vitiation of the air from decomposing matters in the neighborhood of the houses, its weekly removal of the excreta and dry refuse most effectually provides against any nuisance arising or continuing from these matters. The collection of the excreta and ashtubs is also placed under such strict and constant inspection that any nuisance caused by the carelessness of the workmen is quickly detected, and at once remedied. In conclusion, he says, after carefully studying the working of this system for eighteen months, I feel so convinced of the improved health and sanitary conditions which follow upon its introduction in part of the town, that to urge its immediate compulsory adoption in the whole borough seems to me one of the best sanitary recommendations I have given to the health committee.

LORD BEACONSFIELD AND PUBLIC HEALTH.—On Saturday, June 23rd, the Earl of Beaconsfield opened some new buildings which have been erected by the Metropolitan Artisans' and Labourers' Dwelling Association. The object of the Company are stated to be to supply healthy and comfortable homes for artizans, and more especially for the class termed labourers. Each tenement consists of three good rooms, and great care has been taken in perfecting the necessary sanitary arrangements. The Earl then proceeded to speak of the health of the people, which he said was really the foundation on which depended all their happiness, and all their power as a State. The health of the people was, in his opinion, 'the first duty of a statesman, it was quite possible for a kingdom to be inhabited by an able and active population; you may have skillful manufacture, and you may have a productive agriculture; the arts may flourish; architecture may cover your land with temples and palaces; you may have material power to defend and support all these acquisitions; but if the population of that country is stationary or yearly diminishes; if while it diminishes in numbers, it diminishes also in stature and in strength, that country is ultimately doomed.'

SUDDEN DEATH IN TYPHOID.—Dr. Dieulafoy has observed that sudden death in typhoid fever is far from being of very rare occurrence; and he has been able to collect fifty cases. On comparing these together, one fact is strikingly prominent—all the cases occurred at from the seventeenth to the nineteenth day of the course of mild typhoid fever. A recent case furnishes an example. A man, eighteen years of age, passed through a mild typhoid fever without any bad symptom during sixteen days, and seemed to be convalescent, when on the seventeenth day, while talking with a nurse, he was seized with convulsive movements of the face, became pale, and died immediately. To explain these sudden deaths two theories have been advanced. According to the first of these, a reflex influence in the intestinal canal, reacts on the bulb, giving rise to an arrest of the hearts action and fatal syncope. The other theory explains death by a granulo-adipose degeneration of the muscular fibres of the heart. Knowing these facts, physicians and nurses may be especially watchful of their patients about this period.

TYPHOID FEVER.—At the sitting of the Paris Academy of Sciences in February, M. Guèrin communicated the results of a series of experiments made to test the supposed direct influence of water-closets in producing typhoid fever. He experimented upon rabbits, injected into rabbits fecal matter, blood, etc., from typhoid patients, and concludes as follows:—1. The fecal matter contains, after issuing from the system, a toxic principle capable of causing death in a class of animals, in time varying from a few hours to a few days. 2. The same holds good for urine, blood, mesenteric liquid, and the detritus of mesenteric gangloins, and of ulcerated

intestinal mucus of typhoid subjects. 3. These matters, after some months, are found to retain in large measures their original toxical principles. 4. The fecal matter of healthy subjects, or of those affected by other diseases, have not the toxical principles which exist in the excrements of typhoid patients.

TYPHOID FEVER AND FILTH.—A correspondent of the *Medical Times & Gazette*, writing from Paris in reference to the recent debate at the Academie de Medicin, on Typhoid Fever, such a severe epidemic of which prevailed in that city last year, says:—We find that Paris is perfectly riddled with cesspools from one end to the other, by far the greater quantity of fæcal matter is received into these receptacles; and we all know what this means—what soakage into the soil, what chances of water-contamination and of air contamination.

In England I think we have come to recognize that the whole matter lies in a nutshell. It has come to be looked upon almost as a truism that the contamination by sewage of drinking-water, of the air, or of anything else which is taken into the body, is the great essential element in the spread of the disease, and we have in consequence been making enormous efforts for years past to control this spread by guarding against such contamination in every possible way and at all hazard.

Toronto, like Paris, is perfectly riddled with cesspools, which receive the greater quantity of the fæcal matter. Sooner or later here the effects will assuredly follow the causes, if some more active and special preventive measures are not adopted.

A SINGULAR INSTANCE OF LEAD POISONING is reported by a Medical Officer of Health. The disease was in most cases of a very marked character. In quick succession a large number of cases were reported in various houses, mostly isolated, several of which were very severe. They had all in common sent their corn to be ground at the same mill. Dr. Alford accordingly visited and inspected the mill. The mill-stone being of a very loose nature, large spaces had occurred, which of late had been filled up by pouring in quantities of molten lead, and the first grinding of wheat after the 'dressing' contained, no doubt, large quantities of the metal.

A BILL has been introduced into the legislature of the United States which provides for the deposit of security for the payment of damages and costs by the plaintiff in actions or proceedings against physicians, surgeons, and dentists, for damages.

EIGHT cases of transfusion were lately performed in one of the Philadelphia hospitals, in five the results were highly satisfactory. In one case, a very low stage of puerperal fever, the pulse was reduced from 160 to 120 per minute in a short time.

DR. JOHN FINSON, a practising physician in Iceland, states that he has never seen a case of syphilis in a native Icelander, only in foreigners.

No More Coroners.—On the first of July the coroner system disappears from Massachusetts, and a new plan goes into operation. According to this the duty of viewing bodies and making autopsies devolves on officers known as medical examiners, while the examination of witnesses, etc., is carried on in the courts.

From Experiments performed at St. Petersburg, (*Med. and Sur. Rep.*, Phila.,) when small pieces of cancerous tissue are under favourable circumstances, transplanted under the skin of a dog, they take root and grow. Thus, the infection of cancer cells can no longer be doubted.

Salt Pork and Ulcers.—J. H. Morton, L. R. C. P., &c., Ed. writes to the *Lancet* in reference to certain fungoid and bleeding ulcers which he has been called upon to treat, and which he suggests may have been caused by the large quantity of salt pork eaten by the patients.

Perhaps the psychology of laughter has never been better expressed than by Hazlitt :—'Man,' says the writer, 'is the only animal that laughs, for he is the only animal that is struck with the difference between what things are and what they should be.'

Compulsory Registration of infectious diseases has been for some time in force in Holland and Norway, without opposition and with manifest advantage. This affords the strongest evidence that such a measure is practicable in a constitutionally governed country.

It is stated that the Corporation of Wolverhampton, Eng., is about to remodel the east part of that town, at a cost of £160,000, under the provisions of the Artizans and Labourers' Dwellings Act.

Poisonous Peas.—An English chemist has discovered that copper is used in French canned peas to preserve their green color. Several cases of poisoning have recently occurred in England which were traced to this source.

BOOK NOTICES.

Eighth Annual Report of the State Board of Health Massachusetts. This is quite a ponderous volume of about 500 pages, besides numerous charts, tables, and maps, some beautifully colored. It contains a larger amount than usual of highly interesting and instructive matter, which must be of great value to the State in a sanitary way.

Ninth Annual Report of the Inspector of Asylums, Prisons, and Public Charities of Ontario. This is a volume of 300 large pages, containing much very interesting and useful matter in reference to these institutions.