

course of a day, never to be returned back as in tidal ports—subject to no inundations except, perhaps, once in seven years, in Griffintown,—few cities, in fact, have more natural sanitary advantages in her favor—and yet, with all these advantages, she has an annual death rate greater than any city or town on this continent. Other cities, from uncontrollable causes, have periodical returns of sickness caused by climate and the malaria arising from the overflowing of rivers, or from contiguous marshes, but none have, from year to year, the same average amount of deaths, arising from zymotic diseases which are the outbreedings of sewer gases, and, consequently, can only be attributed to imperfect drainage and defective ventilation of houses, there being no other cause, local or otherwise, to which these classes of diseases can be fairly set down. The reason why Montreal is so particularly unhealthy may be summed up in one general clause, and that is, from an imperfect system of drainage, imperfect workmanship in its construction, imperfect plumbing and imperfect ventilation. The principal cause of all, however, is the generation of gases in the imperfect sewers; these gases pass through the water-traps into our houses.

That many sanitary errors, serious and costly, and of great magnitude, have been committed in the construction of our city sewers is a palpable fact, and will hardly be denied by that body under whose administration they were done. Many of these faults arose from mere experiments from the want of practical professional knowledge, but it is no use grieving over what has been done; it is to avoid such costly errors for the future that we now write, and therefore we will merely allude to one of them—the McGill street sewer—a very costly affair, and which has never answered the purpose intended.

That this expensive sewer has been of no use to the city, experience has fully proved to be the case; but the evil that has resulted from it is that, not only has it been a breeding place for gases, but it discharges its putrid matter into the quiet waters of one of the most central basins in the harbor, instead of into the strong current of the river. That the water in that basin must be polluted in the highest degree may be realized from the fact that there was dredged out of it last summer about 15,000 yards of sewage sediment. A more pest breeding arrangement could scarcely have been conceived.

When the water-carriage system was introduced, it was claimed as a crowning point in its favor, the supposed certainty that the constant flow of water through the sewers and small drains would carry every particle of sewage away, and that from occasional flushings from heavy rains they would become thoroughly cleansed.

The assumption for such a theory was undoubtedly correct, presuming every portion of the system was made perfect; but herein, principally, has it failed; that is, in the practical working of the machinery in its most minute details:—so many different trades are employed in connection therewith, that the failure of one party to perform his part of the work properly, would render inoperative the success of the whole system, and so, instead of proving a blessing, it has, we might almost say, been a curse, *i. e.* if the statistics given by the eminent authorities quoted, and of many others we could mention, are to be relied upon. If far more deaths from zymotic diseases have occurred in cities since the introduction of the water-carriage system than before, what other inference can be drawn from it, than that to the gases

arising from the sewage in drains these diseases emanate?

It takes but a very short space of time in warm weather for the bottoms and sides of sewers, tile drains and traps to become lined with a foul mucus matter which slow running water will not detach, particularly after it becomes thickened with excretion and the greasy fluids from sinks; this fluid as it flows gently through the pipes, day after day, attaches more and more of its greasy and sedimentary substance to their sides, which, during the night time, when the flow of water is stopped, gives out the most offensive odours.

As such drawbacks to the water-carriage system must always exist to a greater or less degree—according to the smoothness or roughness of the interior of the drains or pipes, and obstructions within them—there are some points of protection particularly necessary to look to.

1st. To adopt a trap that shall be a better safeguard than the mere interposition of water, so as to effectually prevent gas from being forcibly passed through it.

2nd. Perfect workmanship in every department of the work, even to the most minute details.

3rd. Ventilation to the main sewers in the streets (but never from the main sewers through the houses), and ventilation to the house drains, water-closets and traps, particularly at their highest points.

In considering this subject we should first commence with the *house drains*, from which all sewage originates, for we have always advocated in this Magazine that the house drains are of the first importance, and no matter what amount of money may be spent in the construction of expensive sewers, all is thrown away, as far as the sanitation of the city is concerned, if the house drains and the plumber's work are not made *perfect in every respect*. Upon the care bestowed upon them will, in a great measure, depend the ultimate success of the whole.

To ensure perfect drainage to a city, and perfect ventilation, the following requisites are essentially necessary:—

No organic decomposition should be allowed to take place in any drain within a dwelling, or within any pipe connected with it. No refuse matter or foul water should be thrown into yards. In order to secure the perfect cleanliness of the closets, sinks, pipes and house drains, we recommend that there should be an arrangement by which they could be mechanically cleansed, and scoured out by the pressure of water being sent through them—this should be done at times under an official appointed for the purpose. There should also be a periodical flushing of the street drains. The pressure of water in a pipe of course ceases as soon as it leaves it, and therefore what flows from water-closets, pans and sinks, has not sufficient force to clean out excreta or sediment from the traps, until after several times being applied, and will not purge the pipes of their foul mucus lining.

The rain that falls on house tops should not be allowed to fall into the streets and yards—by falling into the streets it washes into the sewers a large quantity of sand and other substances which settle at their bottom in a sort of concrete, which necessitates frequent removal, and that which falls into boarded yards keeps them damp and fetid, and a breeding place for germs. It would be much better if carried direct into the house drain and made to act as a scourer and ventilator at the same time.