

held 144 meetings, examined 197 expert witnesses, and sent out circular letters all over the world asking for and receiving all kinds of data. This commission published their report, which in 1908 was considered the most complete and authoritative treatise on the subject of sewage disposal. The German Government have been examining into the question and have employed not only expert engineers, but expert chemists and biologists; they have issued from time to time reports and treatises which have been translated and have become common knowledge to the sanitarian. Many of the American States, such as Massachusetts, Ohio, etc., have formed central experimental stations governed by experts, and have issued annual reports for years, handing out the most valuable and exact data and conclusions to the world generally. Many civil engineers and chemists have given their whole time and energy to this question of sewage disposal.

Now it is generally acknowledged that all these authorities are in agreement on certain general principals.

The generally accepted principals may be defined as follows:

(a) Sewage contains quantities of mineral and organic matter. The organic matter is found both in the form of suspended solids and solids in solution, and is liable to putrefaction. The process of putrefaction causes foul odors and is apt to create a nuisance at the point of discharge.

(b) Sewage contains the germs or bacteria of certain diseases, especially the infection of typhoid fever. These germs are found mostly in connection with solid matters, particles of animal tissue, etc.

(c) The putrefaction of the organic matter will not cause any specific disease. The organic matter, apart from the disease germs it contains, is harmless, and the gases which are given off, causing the foul odors, are likewise harmless, as long as they are not in sufficient quantity to displace the natural oxygen of the air and thus cause asphyxiation. The germs of diseases are not carried by the gases and can only be liberated from the sewage by splashing in the immediate neighborhood of the disturbance. Sewer air (at one time thought otherwise) is not capable of spreading contagion. Contagion or infection is only obtained by direct contact

of some particle of sewage, containing the disease germ with food (solid or liquid). If sewage contained no disease germs (no matter how foul the sewage or otherwise) it could not produce typhoid or any other disease even if it came into contact with milk or drinking water. The whole danger to health, the pathogenic danger, or the sanitary danger connected with the distribution of sewage, is entirely due to the specific disease germs which have originally come into contact with the sewage. Sewage in its purely chemical constituents is not dangerous. Sewage in its biological or bacteriological constituents is dangerous.

(d) The ultimate aim in sewage disposal may consist of (1st) only dealing with the organic matter in such a way that it will cause no nuisance, viz.: that at the point of discharge no putrefaction shall take place and thus no foul odors will be emitted, (2nd) dealing with the organic matter in such a way that all disease germs are exterminated, so that the power of distributing disease is taken away from the sewage, (3rd) dealing with the organic matter in such a way that both of the above objects are realized.

(e) It is known that when the organic matter in sewage comes into contact with a liberal supply of oxygen, that the organic matter undergoes a change which renders it non-putrefactive and no foul odors are emitted. In order to avoid any foul odors or nuisance from sewage all that is required is that it be partly oxidized.

(f) The sewage disposal systems which have aimed solely at the avoidance of a nuisance by systems of oxidation have not been sufficiently complete to destroy the germs of disease.

(g) In order to exterminate disease germs from sewage it is necessary to go a step further than merely to provide a non-putrefactive sewage, and to provide some efficient system of disinfection.

There is not one of the above general principals which can be picked out and allowed to be in contradiction to the conclusions of all the great authorities upon this subject. These conclusions are not new, they have been understood and acknowledged by scientific man for many years now. Wherein, then, is there any foundation for saying that "Old principles must give way to new?"