Dangerous Bacteria is Sewage Differs from Harmful Gases in Sewers

By William. C. Groeniger
1937 ASSE YearBook

The Charge Against Soil Pipes Has Not Been Dismissed

The inspiration for this paper came from reading an article which appeared in Colliers, 11-14-36, in which the author confuses sewer gas and typhoid fever with sewage and typhoid fever. The article is one which indicates a lack of knowledge or a common understanding of the functions of a soil pipe. We quote in part from Colliers, 11-14-36, as follows:

"It was once generally believed that typhoid fever might be caused by sewer gas, and any soil pipe in the house was regarded as a menace to the health of the inmates because it might spring a leak. But medical research has long since proved that infection cannot be conveyed by this means. Furthermore, air ventilation can be provided for with perfect safety by a vent and a trap in the soil line.

"Nevertheless, the Briton, once convinced of the guilt of soil pipes, refused to believe in their innocence, even though the charge against them had been dismissed. British law still bars them from inside the house. Anywhere in and about London, even on apartment and office buildings great ugly excrescences can be seen crawling in all directions. An American friend of mine in England desired to install in his house an extra bathroom, which for architectural reasons had to be in front. But no permit could be secured unless the ugly black pipes disfigured the facade. The Briton carries his prejudices even into his scientific laboratones, where open drains in the cement floor are built to carry off wastes."

Perhaps the least difficult way to unscramble the matter is to begin with a simple definition of a soil pipe:

A soil pipe is any pipe which conveys the discharge of water closets, with or without the discharges from other fixtures to the house drain.

Synonymous with the word "soil" is foul, dirty, begneme, besium, besmater, besmire, daub, bedaub, stain, tarnish, sully, defile, pollute. "Soil" in this application means dung, feces, manure.

The true definition of a soil pipe is a pipe for carrying off excrement and urine from places of human habitation and occupancy. The function of a water closet is to receive bowel and kidney eliminations preliminary to their being flushed, ejected or siphoned from the bowl by means of flowing water and discharged into the soil pipe. It should be quite clear by now that the inside of a soil pipe is foul, and that is the reason for applying the word "soil" to the word pipe.

For centuries mankind has recognized that human excreta and urine may contain harmful bacteria (typhoid, dysentery and diseases of the intestines) and must be quickly and safely disposed of because they are dangerous to life and health.

No matter if installed inside or outside of the house any soil pipe that leaks sewage or sewer gas is a menace to the health of the inmates.

Typhoid Fever

Typhoid fever is known as an infectious, febrile disease, caused by a baccillus introduced into the system with the food or drinking water, and characterized by catarrh of the intestines, enlargement and necrosis of the peyerian glands, enlargement of the spleen, and mesenteric glands, peculiar eruptions appearing on the seventh, eighth, and ninth days consisting of small slightly elevated rose-colored spots, and often diarrhea.

Reduction in Typhoid

Some thirty years ago there were about 450,000 cases of typhoid fever each year, and an annual death toll of 45,000 from this disease. By 1925 the number of cases of typhoid had dropped to 150,000 and the deaths to 15,000. This 300 per cent decrease is due chiefly to:

(1) Safe water supplies.
(2) Quick and safe removal of fecal matter through the medium of a water closet bowl.
(3) Adequate sewerage systems.
(4) Elimination of the privy vault, the principal breeding place of the common house fly —carrier of disease germs from the privy to human food. Elimination of sources of pollution of private water supplies.

The water closet bowl can hardly be denied its proper place of importance in the reduction of typhoid fever in the United States. The practice of swatting flies and screening houses against the fly is often given full credit for the reduction of typhoid fever, but to eliminate a disease it is necessary to remove the cause.

Making filth inaccessible to the fly removes his power to do harm as a carrier. In-
sects and vermin are carriers. What the fly is to typhoid, the louse is to typhus and the mosquito to malaria fever. When vermin cannot become infected, they cannot transport disease from filth to man, or man to man.

Remove the cause and prevent the disease. Typhoid is a filth disease, and the quick and safe removal of fecal matter is an act of prevention.

The primary function of the soil pipe is to convey polluted matter from the water closet to the house drain and house sewer. Secondary functions are to furnish air to maintain atmospheric pressure and provide for air circulation within the pipe, and ventilate the sewer.

**Leaky Drainage System Insanitary and Dangerous**

The leakage of polluted water from the soil pipe or house drainage system is insanitary and dangerous. Leakage within the building may pollute the habitation and permit food infection through the medium of insects. Leakage in the ground outside the building may pollute water in neighboring wells or find its way into or under the building.

The maintenance of water seals between fixtures and drains and the permanent tightness of soil pipe and drainage systems are important, not only because they prevent the passage of air, but because they prevent the access of insects to the interior of the drains and sewers. If cockroaches, water-bugs, and other vermin can pass from drains to food, they may transport disease germs and thus be a bacteriological menace to health. The open sewer connection also provides a runway for rats.

**Gases in Sewers Dangerous to Mankind**

The air in sewers and drains often contains gases resulting from the decomposition of excreta, soap, fats, and other wastes, together with gases from mineral oils which may come from garages, streets, and industrial establishments. Illuminating gas may also find its way into sewers through leakage. Among these gases may be found methane, sulphuretted hydrogen, and carbonic oxide. In large amounts these gases are poisonous to the human system and there are physiological objections to breathing them even in small quantities: Violent explosions in sewerage systems and the loss of lives of sewer workers bear testimony to the dangers of sewer air. Again, the odor of these gases is repugnant to human beings.

Those who have self-experience know sewer air will produce shallow breathing, headache, and even nausea. Any worker in a room with an open sewer connection soon recognizes the necessity of closing the opening.

Sewer air, sewer gas, or sewer vapor may not contain disease-producing bacteria, derived from human excreta and body wastes, often found in sewage. Hence, it is argued by some that escaping sewer air, sewer gas, or sewer vapor has no influence on health. Clean air is essential to life, and the air of sewers or drains should be kept from entering buildings if for no other reason than the harmful gases which may be poisonous to the human system.

**Explosive, Poisonous or Suffocating Gases in Sewers**

Appearing in the August, 1937, issue, Vol. 8, No. 8, Municipal Sanitation, is an article entitled: "Safety Equipment for Gas and Fumes" by Leroy W. Van Kleeck, Senior Sanitary Engineer, Connecticut State Department of Health.

This article emphasizes an ever-increasing danger of encountering explosive, poisonous or suffocating gases in sewers, and suggests tests to detect the presence of such gases should be made before men are allowed to enter such structures. The article calls attention to, "explosions in public sewers have been experienced by almost every large city in both America and Europe. Insurance records contain many cases of asphyxiation, poisoning and physical injury from gases by men working in sewers or around sewage disposal structures."

Van Kleeck recommends a minimum safety procedure for sewage plant operators and sewage maintenance crews before entering sewer manholes, settling tanks or other subterranean structures connected with sewers or sewage treatment plants, where the presence of gas is suspected.

(1) "First determine if the concentration of any combustible gas, which may be present, is below, within, or above the explosive range. For this purpose use an approved combustible gas indicator."

(2) "Having determined that no explosive or inflammable gas mixture is present, it is necessary to know that no toxic gases are present, in particular carbon monoxide and hydrogen sulphide. If illuminating gas leaks are suspected in sewers, a carbon monoxide indicator, a carbon monoxide detector or carbon monoxide detector ampoules should be used."

(3) "Of the remaining sewer gases the presence of a strong odor, or irritation to the eyes and respiratory passages, are generally warning enough to indicate the need of thorough ventilation and chemical testing before men enter."

(4) "Atmospheres containing less than 13 per cent by volume of oxygen are considered decidedly dangerous to man."

(5) "In emergencies, such as the saving of life, instructions 1 through 4 are of course obviated by the use of a hose mask or self-contained oxygen breathing apparatus."

The article by Leroy W. Van Kleeck, Senior Sanitary Engineer Connecticut State Department of Health, appearing in the August issue of Municipal Sanitation, emphasizes the danger of persons encountering explosive, poisonous or suffocating gases in sewers, which reinforces the importance of installing permanent, tight soil pipes in buildings used for human habitation or occupancy.

**Boiler Plate**

Some thirty years ago there appeared in the daily press boiler plate articles emphasizing that plumbing had no relation to health. These newspaper articles credited medical science with the discovery that because sewer gas did not contain bacteria and therefore could not convey typhoid germs it was not dangerous to health. Books on public health during that period refer to plumbing as having the same relation to health as walls, ceilings, floors, brick, plaster, and lumber. Between 1910 and 1920 it was my privilege to come in contact with many persons who had been taught and firmly believed there was no relation between plumbing and health. Misinformation of this character not only creates disrespect but gives to people false security.

It is unbelievable that any informed person would deliberately twist the facts. To permit the statement quoted upon the first page to go unchallenged would be neglect of duty. On the other hand, if the statement was made with a false conception of the facts correction of the error is a responsibility.

It is hoped that the distinguishing features between: (1) Dangerous Bacteria in Sewage; and (2) Harmful Gases in Soil Pipes and Sewers have been made clear.
It is certainty that typhoid fever may be caused by sewage. Sanitary research has long since proved that infection can be conveyed by sewage.

Air ventilation does not remove the danger of pollution by sewage. Again, sanitary research has long since proved that explosive, poisonous and suffocating gases are found in sewers.

The Briton's respect for a soil pipe was gained from the knowledge that the soil pipe conveys human excrement which may contain typhoid or other harmful bacteria. The Briton rightfully refused to believe that the soil pipe is innocent of possible danger to health and life. The Briton is rightfully convinced of the guilt of soil pipes and refuses to have the charge against them dismissed. In America we design and install the soil pipe within the walls of buildings but require that they be air and water tight and of durable material.

We say "cheers" to the Briton's insistence that the soil pipe is the potential enemy of mankind and must be at all times safeguarded in order to protect persons against injury to health.