

tion is not only possible, but comparatively easy, and it is *demanded* of us as physicians and sanitarians guarding the public health.

CLEANLINESS THE CHIEF ANTISEPTIC.

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In these days of bacteriologic investigations much time and study is necessarily devoted to the prevention of disease by destroying the bacilli that have entered the human body or preventing their entrance. The latter of these methods is to be preferred where it can be done, and it is the province of this paper to show that this may be accomplished much more thoroughly and satisfactorily by perfect cleanliness than by the use of so-called antiseptics. First, a few words regarding the physician and surgeon in whose practice cleanliness is an absolute necessity. This branch of my subject, although not precisely to be classed with State Medicine has nevertheless a bearing on it, and will form a suitable introduction to the main theme. Let us first speak of the surgeon and his work, in which the necessity of cleanliness is most apparent. If the surgeon will see that his hands, his person and his clothing are clean, that his instruments have always been thoroughly cleansed immediately after using them and are then cleansed again just before using, much difficulty will be avoided. Drenching the body and its exposed cavities with antiseptic fluids is not always the best thing to do, as injury is sometimes done by the absorption of the poisonous articles used as antiseptics. When a laparotomy is performed in which the interior of the abdomen is exposed to the outer air; when the interior organs are handled by the surgeon or his assistants: when instruments and sponges are introduced into the cavity and come in contact with healthy organs, the necessity of perfect cleanliness becomes apparent even to an inexperienced observer. I have seen surgeons who prided themselves on their extreme care in preserving antisepsis, make lamentable blunders by allowing sponges that had been in contact with diseased parts, removed from the abdominal cavity, to be used again in cleansing the cavity after the operation, preparatory to closing it up. Many little errors of that kind, escaping observation at the time, contribute to unfortunate results which are then ascribed to something else. A few words about the physician before referring to the main topic. Here cleanliness is just as important as in the case of the surgeon, although not always so carefully observed. See the number of cases of puerperal peritonitis caused by the carelessness of the accoucheur in handling the puerperal woman with unclean hands or with imperfectly cleansed instruments. I knew a case of a physician who was skilful, amiable and generally beloved, compelled to abandon the practice of medicine because, during one season, almost every case of obstetrics he attended was followed by puerperal fever, fifteen of which died within the space of a few months. Now there is no doubt in my mind that he carried the disease from one patient to another by a want of proper attention to cleanliness. He either failed to clean his instruments thoroughly when he used them,

or carried some of the contagion on his hands. There are many places on the hands that escape the scrutiny of the owner, even when he employs frequent lavations; as under and around the nails, between the fingers, etc. The thermometer may carry disease when used in the mouth, if it is not carefully cleansed before and after using. In treating contagious and infectious diseases absolutely perfect cleanliness will do much toward preventing infection of the patients who are seen afterwards; the hands, the clothing, the hair and beard of the doctor may do much mischief if not kept perfectly clean.

We will now approach our main subject, the prevention of disease by cleanliness, so far as this can be controlled by the public authorities. Disease is undoubtedly propagated by germs, bacteria, micrococci, bacilli, or whatever they may be called. These germs may be conveyed into the body by the air passages or by the alimentary canal. In regard to the former, many would say that legislation can do nothing to purify the air. This, however, is not true. Consider the sewer gas, the exhalations from manure piles, the foul smells from shallow or full privy vaults, the odors from reeking back yards and alleys, and you will find them filling the air with all kinds of disease germs. When there is any talk of a prospective invasion of cholera, how all the papers teem with cries for a general cleaning up! How the health officers and inspectors begin to bestir themselves, ordering the people to clean up their premises, throwing copperas and other alleged antiseptics into holes from which issue foul smells, not knowing, perhaps that about all the effect these so-called antiseptics have on the bad air is to substitute another smell, so that the original one is not perceived. If the health officers and the health boards under whose authority they serve, instead of getting spasmodic fits of cleaning up, would exercise eternal vigilance to prevent the accumulation of filth, would have the plumbing of houses, the sewer system leading from the dwellings to the streets regularly inspected; if they would devote time and labor to the proper construction and maintenance of the sewer system in the streets of their cities; if they would appoint men to attend to this business who have made this work a special study, instead of making their appointment a means of bestowing political patronage upon their favorites, there would be infinitely better results.

In a paper I read before the Wheeling Medical Society, I spoke of the air as one of the media through which the bacillus of typhoid fever is conveyed into the system. This was controverted by several members who have had a bacteriologic training, on the ground that the bacillus of this disease can only be propagated in the alimentary canal. Admitting this hypothesis I still maintain my position. We will suppose that the excreta from a fever patient have been deposited upon the surface of the ground, or have found their way there from an imperfect receptacle, what becomes of it? It mingles with the soil and much of it is converted into dust. This dust pervades the atmosphere and is inhaled by people who move about in the air thus polluted. "But," says the objector, "the lungs do not form a suitable nidus for the bacillus of typhoid fever." Granted. But what becomes of the dust that clings to the cavity of the mouth, the palate, the pharynx, the upper part of the esophagus? By the next drink of water or any other fluid that is swallowed, the whole of it

is washed into the stomach where it does precisely the same work as that performed by the polluted drinking water. From this we see that impure air may even be instrumental in propagating diseases that do not develop in the air passages.

Much can be done by legislation and continual vigilance to purify the air of disease germs, in the way of proper attention to sewerage, the prompt destruction by cremation or otherwise, of the filth that is so often left rotting on the surface of the ground. The methods of doing this I do not propose to discuss here, that being a subject too extensive for a single paper.

Having spoken of the air which enters the mouth and nostrils, we will take up the substances that are taken into the stomach for nutrition, *i. e.*, food and drink. I will endeavor to show that much can be done here by being clean and by using our utmost endeavors to prevent anything that is unclean from entering the great work-shop of the body, the alimentary canal. When I speak of clean food I do not mean only the absence of that which is generally known as dirt or filth; for the average housewife will see that such impurities are not permitted to defile the food she prepares for the use of her family. I mean by impurity everything that is not a natural constituent of the article of food that is to be prepared for the table. All sorts of adulterations may be characterized as impurities. Some of these are of the grossest kind. For instance, the various ground spices that are sold by the grocer for family consumption. Who can tell what filth and what bacteria-laden substances are added to pepper and other spices to make them more profitable to the dealer, but deleterious to the consumer? The adulterations of butter, lard and other fatty substances are sometimes of a character that is injurious to health and dangerous to life. Meat can not be adulterated but it may come from diseased cattle, sheep or hogs. I know a man whose cow died of some unknown disease when she was near calving. The owner being a butcher, dressed the meat for market and sold it. He also prepared the unborn calf in the same way and sold it for first class veal. You might suppose that vegetables at least must be pure. Even here much filth may be found. Take radishes, lettuce, etc., which are raised in hot-beds for early use and in highly manured ground for later consumption. What is used as a fertilizer to hasten and render more luxuriant the growth of these vegetables? It is the manure taken from stables where may be diseased horses or cattle; or from privy vaults of the city where may have been deposited the dejecta of patients suffering from typhoid fever or other infectious diseases. This manure is not prepared by a chemical process which would destroy the life and activity of the germs that might be contained in it; but it is put on fresh just as it comes from the reeking receptacle. These vegetables are eaten raw and even if the sap going into them is purged of all germs, yet the outside of them is in close contact with the soil enriched by the manure which teems with all sorts of bacteria and may be, in some instances, a deadly poison. All these sources of impurity can and should be prevented; and it is the duty of every conscientious sanitarian to do all in his power to render the food we eat as clean as human care and watchfulness can make it.

What we drink forms a much more abundant and

deleterious source of disease than anything else. The effects of spirituous, vinous and malt beverages do not come under my consideration unless they are adulterated with poisonous substances. I will leave the discussion of these articles to the tender mercies of the temperance lecturer, prohibitionist, etc. Although water forms by far the largest constituent of the human body, and must be constantly consumed in order to keep us alive, it is nevertheless the most prolific source of disease. It is not necessary to explain here how the germs of disease find their way into the water; for that is known to every intelligent and well read physician, and most certainly to every one who pays any attention to sanitation. To keep the water used for drinking clean, *i. e.*, free from bacteria, is one of the great problems of the hour.

In most of the cities of our land the water is pumped from running streams into reservoirs and thence sent through a system of pipes into the dwellings of the inhabitants. Now let us look into the character and qualities of this water and see whether it is clean and fit for use as a beverage. In order to make a test case by which all other localities may be judged, I will select my home, Wheeling, W. Va., situated on the Ohio River, ninety miles below Pittsburgh, Pa. What an amount of filth is poured into this stream by the two great rivers, the Allegheny and Monongahela, one of which, at least, passes through a densely populated region, I shall not endeavor to portray. But let us look at the stream from which our water supply is taken and let those who hear or read this paper judge if it is clean. Between Pittsburgh and Wheeling are about twenty-eight towns and cities situated on both banks of the river. Besides there are numerous small tributaries that have towns and villages on their banks. Now what becomes of all the filth and excreta that are deposited by the inhabitants, both human and animal, in these places? You all know that the greater part of them finds its way into the stream running by. Much is being done and has been done to obviate the difficulty and to remove this source of disease. But this is scarcely a drop in the bucket. Crematories are established here and there for the destruction of garbage and the contents of privy vaults. But what proportion of the disease-breeding filth is thus destroyed? Very little. Some years ago, the Legislature of West Virginia passed a law prohibiting the throwing of filth of any kind into a running stream. But who is there in the rural districts to see that the law is executed? Even if it is obeyed, where do they put their objectionable substances? If it is manure, animal or human, they spread it on the ground and the first rain that falls washes it down into the nearest stream. These streams carry the pollution into the great river, and the unfortunate people dwelling on its banks pour this polluted, disease-producing fluid into their stomachs, where it is likely to breed pestilence and cause destruction of life. The country districts, where the water supply is not obtained from the river, are not exempt from this scourge. It is often cited by those who do not believe in the theory of infection, now almost universally accepted by the profession, that epidemics of typhoid fever exist in villages far away from the great source of contamination, the river. Now let us investigate a typical farm-yard, or a home in a village in which horses and cows are kept. This

farm-yard, in a hilly country, is generally located on a gentle slope; the dwelling near the front with perhaps a moderate sized lawn. In the farm-yard is the well, an old-fashioned affair with a windlass, by means of which the "old oaken bucket, the moss covered bucket" is lowered and raised, bringing up the clear and limpid fluid of which the farmer is so proud, boasting that he has the finest water on the whole country side. In the rear, and consequently at a greater elevation are the stables, the cow sheds and the inevitable privy. This latter is generally shallow, liable to overflow when a heavy rain falls. This overflow runs down the slope, and much of it finds its way into the unguarded and carelessly constructed well. Now, let us suppose some visitor has come from the city; or one of the members of the family has visited a friend in the city where the river water is used, and returned. A case of typhoid fever occurs; the contents of the night vessel are emptied into the "backhouse" as they call it. The overflow comes and the well is polluted, the water being charged with bacilli. The inevitable consequence is that other members of the family become infected by drinking the water. Should neighboring families use out of the same well, as is often the case, they take in the contagion, and an epidemic on a small scale is the result. Now what is to be done here? We can not put antiseptics into the water to kill the bacilli for two good reasons: 1, it would render the water unfit for drinking; 2, it would not destroy the poison.

Antiseptics have by no means the powers that have been attributed to them. It was suggested some years ago to administer antiseptics, such as iodine and carbolic acid to fever patients for the purpose of destroying or neutralizing the ptomaines which cause the disease. I paid some attention to that practice, observing that all the young physicians employed it. I also tried it in some cases myself, although I had but little faith in its efficacy. I discovered that the death rate was not diminished by that method of treatment. Much preferable would be the treatment first proposed by Debove; subsequently experimented on by Lichteim and lately adopted with great success by Maillart, of Geneva, called the drinking treatment; in which large quantities of water are administered to the patient for the purpose of diluting and washing out the toxic substances in the alimentary canal and the blood. So we see that neither in nor out of the body is much gained by piling in antiseptic substances. The best thing to do is to see that everything that enters the body is clean, *i. e.*, free from deleterious ingredients, whether disease germs or irritating substances. It is utterly impossible to do this with absolute perfection; but we can at least approximate to a perfect standard of cleanliness.

I might go on ramifying this topic and speak of the necessity of giving none but pure uncontaminated water to the cattle, as much has been said lately concerning the communication of typhoid and other fevers through the milk, many cases of which have been proved beyond a doubt. It has long been known that certain diseases are communicated to persons using the milk from cows that are not themselves affected by these diseases; and this is sometimes plainly traced to the water that the cows drink. But my paper is already assuming an unwarrantable length and I will not discuss that here. If the phy-

sician is always clean in his person and clothing; if he takes care that his thermometer, or any other instrument he may have occasion to use, is thoroughly cleansed before and after using; if he insists on cleanliness in the sick room and of the patient as well as of the attendants, much trouble will be avoided and the death rate greatly diminished. If the authorities will use their utmost endeavors to purify the atmosphere, not by distributing antiseptic vapors, but by seeing that the least possible filth goes into it; if they will adopt the necessary precautions to prevent the sale of impure food; and if they will not only make laws but exercise eternal vigilance in their execution, to render the water supplied to the inhabitants, clean, in the proper sense of the word; not only clear and transparent, but free from the germs of disease; the general health will be vastly improved, the death rate will be reduced to the minimum, and preventable diseases will be almost stamped out. It will be found that antiseptics will not play so important a part as they are doing now; neither will the physician's duty be as sad and somber as it is at the present time. He will constitute an advisory committee to show his clients how to avoid disease, and will be a gentle help in alleviating the sufferings of those who are afflicted with unavoidable and incurable diseases. Let us hope it may not be too long before we reach "this consummation devoutly to be wished."

COMMON CARRIERS AS DISSEMINATORS OF CONTAGION.

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It is not necessary here to consider the part played by sea-going craft, for this, as a factor in spreading disease, is practically eliminated. The ancient method of detention for a definite period has been superseded by inspection and exclusion of infected persons and things at the port of departure and repeated inspection, with disinfection if needed, at the port of arrival. Neither is it necessary to speak of the modern methods of inland quarantine, in which inspection with cleansing and disinfection have obviated all serious interruption of traffic. In both the measures used are reasonably efficient for the protection of the public, and at the same time generally satisfactory to carriers.

There is, however, a source of danger which so far, has attracted little attention, and no measures have been put in operation to counteract it. This is the disposal of the excretions of travelers on inland waters and on railway cars, in such manner as to prevent the contagion which they carry from reaching other persons. There are certain communicable diseases, whose contagious property is discharged from the alimentary canal, and is liable to reach the alimentary or respiratory tract of other persons, if not intercepted or destroyed. Cholera, typhoid fever, dysentery and intestinal tuberculosis are notable examples, and they are common enough among travelers by rail and by steam-vessels on inland waters to become a source of serious danger.

In some of the States there are statutes which forbid the pollution of streams by animal impurities,