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A QUARTERLY REVIEW MAGAZINE

AND RECORD OF

**SANITARY PROGRESS**

— EDITED BY —

**EDWARD PLAYTER, M.D.**

*Public Health and National Strength and Wealth.*

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# The Health Journal.

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JULY, AUGUST AND SEPTEMBER, 1888.

No. 7.

## THE RISE AND PROGRESS OF SANITARY ENGINEERING WITHIN THE PRESENT CENTURY.

BY SIR ROBERT RAWLINSON, K. C. B.

THE following are the most practical extracts from an exhaustive paper read before the Council of the College of State Medicine, by this eminent Engineer and Sanitarian, as published in the Sanitary Record of August 15, 1888:—

Sound sanitarians must desire cleanliness in all things, but need not indulge in fads. A theorist, if he lets his theory become master, finds all things about him bending to suit his ideas. A pure theorist may be compared to a man digging himself down in a well, who, in this condition, necessarily sees less and less of the world and its ways the deeper he gets, and yet he believes he sees the whole, and so long as his fad holds him argument is of no avail....

As to disease in excess during epidemic periods, we do know, by experience, that it may break out suddenly in poor, dirty, over-crowded room-tenements; and, if the great ocean passenger steamers continue to load and overcrowd the steerage passengers as at present, we may hear of a terrible mortality on some of these vessels from foul air, dirt, bad food, impure water, and overcrowding. How is it that these fine vessels swarm with rats and other vermin?....

**PUBLIC BATHS, DISINFECTION, ETC.**—Some of the principal improvements in sanitary science, after main-sewering, house-draining, water-supply, and scavenging, have been the establishment of PUBLIC BATHS and WASHHOUSES with DISINFECTING APPARATUS. Some of these establishments have, however, been too grand and costly, as also placed too remote from the poor, and consequently have been failures.

Washhouses and baths for the poor should be situated in the heart of poor districts, their management should be economical, the charges the lowest, and for disinfecting bedding and clothing, gratuitous; any bedding or clothing requiring to be burned, to be replaced without charge to the poor afflicted sufferers, this being the truest economy for the ratepayers. Punish a man for having disease and he will shrink from you; treat him kindly and sympathetically, and he will respect you....

One improvement is greatly needed in hospital arrangements—namely, to establish cheap hospitals in the open country in

pure air, where, as a celebrated physician said, "the greatest bungler cannot kill, in place of having them in crowded parts of towns, where the most skilful surgeon cannot cure." Then hospitals for the poor should be cheap, and not on the London scale of £1,000 per bed, plus furnishing and administration, where the cost of a poor patient's bed in interest on the outlay is more in amount than any wages the occupant ever received.

**SANITARY WORKS AND LOCAL RATES OF DEATHS.**—It has become usual to credit sanitary work, such as sewerage, draining, and improved supplies of water, with the observed reduction of deaths in the district, and I am not inclined to repudiate this, as I believe that good sanitary works tend to promote comfort, prevent sickness, and prolong life; but I also see other powerful influences at work on this great and most interesting problem; namely, education, increase of temperance amongst all classes, better wages to the artisan workers, shorter hours of labor, cheaper food, cheaper clothing, and a wider-spread sympathy of class with class. And woe to those men who, through the press or other means, use their evil influence to set class against class, or to keep them apart.

Much has been done in town sewerage and in bringing in improved supplies of water, but of what benefit are these to the unfortunate dwellers in single-room tenements? Because for their occupants, these sanitary works have no practical meaning. Water, to be of practical use, must be within the tenement, and constantly at command. There must, of course, be sink and drain to remove it. Soil-pan accommodation must be near and available, and these, as in solitary prison cells, may be in a recess to be at all times available. When tenements for honest working men are as well provided for as cells are for criminals we shall be a wide step in advance. But single rooms for families ought to be illegal, as it is impossible to have decency with a family under such conditions. . . .

To compare rates of mortality equitably fuller details must be given than are usually set forth. The site of the town, its age, its arrangement of streets and houses, the occupations of the people, their status in society, and the form of government they are under. Men are very much what their surroundings make them; paupers perpetuate pauperism; criminals perpetuate criminals; and beggars perpetuate beggars, and if uncared for by the government they are born under, will do so to the end of time. State laws and regulations must embrace every member of the State, and deal with him equitably. The idle man must be shown that to eat he must work, and the rogue that to have his liberty he must be honest.

**UTILISATION OF TOWN SEWAGE.**—Since 1857 there have been three Royal Commissions appointed to inquire and report 'as to the best modes of distributing the sewage of towns and applying it to beneficial and profitable uses.' Of the last Commission the Right Hon. Lord Bramwell was chairman. Of the 1857 Commission Sir J. B. Lawes, Bart., was a member. Under this Com-

mission experiments were carried out with sewage in producing grass, making hay, feeding milch cows and bullocks, many hundreds of experiments being made, and recorded in the Blue-book report then produced as to the composition of sewage, and proving the wholesomeness of the milk and butter produced and the beneficial results in bullock feeding.

In addition to these exhaustive experiments, there have been analyses and reports on town sewage by the most eminent chemists in Europe with one result—namely, that sewage containing excreta holds in suspension and solution manurial ingredients of agricultural value when applied to lands, but that when precipitated by chemicals the process is costly and the sewage is not purified, the abstracted sludge having no commercial value. The Metropolitan Board has paid more money to chemists and engineers for advice as to the best and cheapest means of dealing with sewage, and deliberately adopts the most costly and the worst. The only consolation about it being that with time the costs will be found so great and the results so inefficient that the arrangements must be abandoned, and then works approved and sanctioned by experience must be carried out. The river must in fact be purified. To precipitate the solids of sewage there must be tanks and machinery, and when the solids have been removed, the clarified sewage retains about  $\frac{7}{8}$ ths of the salts of sewage, plus some of the salts of the chemicals used, so that however costly and complete the process may have been, the clarified sewage, in summer weather, will ferment and become a source of nuisance so as not to be permissible to pass into any stream.

The only practicable way, therefore, to free sewage from the manure it contains is to put it in a thin film on to land over which it may flow and through which it may filter, when the surface-soil and vegetation at once combine with the manurial ingredients, the water passing away by evaporation and absorption, or along open carriers. In one hundred tons of fluid sewage there will not be more than from one to two tons of solids which will deposit, and this will be in a finely divided state, so that spread over one acre of land it at once disappears. In some of the first formed sewage-farms it was thought necessary to allow the crude sewage to rest in tanks so as to separate the heavier solids, but this was soon abandoned, as it was proved that tanks so used became putrid, and then imparted this property to the sewage, experiment and practice showing that the sooner the sewage could be passed to the land the better, as then there was, under judicious management, no offensive exhalations.

I have not time in this paper to go into fuller detail, and can only again remark that the Metropolitan Board will have to abandon the costly works which they are establishing for subsidence and treatment by chemicals, and cease to barge the abstracted solids to the sea . . .

The Royal Commission, of which Sir J. B. Lawes was a member, came to the conclusion that town sewage might be worth to a farmer, if compelled to take it all the year round, about one

penny per ton. But twopence per ton might be paid, if only taken at intervals, in summer. The sewage of the Metropolis, valued at one halfpenny per ton, would be worth, in round figures, nearly one million pounds sterling per annum. Is it, then, a judicious process to make complicated and costly works to continue a great nuisance, and waste manure when it is of so great value?

The inland towns of England have found out the value of town sewage as a manure when used in broad irrigation, as at Birmingham, Bedford, Nottingham, Doncaster, Leamington, Cheltenham, and other places. On the Continent, Brussels, Paris, Berlin, and Dantzic. . . .

It is said that constant application of sewage will corrupt the land. Experiments over sixty or seventy years, and in some cases for two hundred years, disprove this, as it is found that the sewage deposit is so small in thickness, and is distributed so evenly, that it at once becomes incorporated with the natural soil and loses all taint; the penetration of the sewage leaves all the solids in the first few inches of porous soil. There is no more corruption of the land with sewage than with other manures, as experience proves.

Modern sanitary science teaches that the removal of excreta from sites of towns and of houses as rapidly as it is generated is of the first importance. And experience further proves that the inhabitants of towns must be supplied with water for domestic uses, this water, after use, having to be got rid of. Sewers and drains must therefore be provided for this purpose, and it has been found in practice that the drains sewers, and waste water will convey the excreta imperceptibly from water closets to any distance at no cost for carriage. The sewers and drains of a properly sewered town and properly drained house transmit waste-water and excreta at rates of from one mile per hour to several miles per hour, in proportion to the fall of the sewers, so that in London, if every sewer and every drain were in perfect order, the entire volume of waste-water with excreta will be out of the entire site each day.

The excreta being silently and harmlessly got rid of, there are street sweepings and dry house refuse to be got rid of besides, and in no case should street sweepings remain beyond the day or dry refuse beyond the week. . . .

To have sanitary works and cleansing arrangements in such order as shall promote comfort, prevent sickness, and prolong life, money must be expended and rates must be paid; and where there is good local management, the payment of rates is the best money made by the householder. Some amiable and in other respects intelligent men, members of Parliament, have recently expressed alarm at what they call the dangerously accumulating municipal debts. I can only assure these gentlemen that they are utterly mistaken, as every farthing of every municipal debt will in time be paid, and in the meantime the public enjoy wholesome towns and houses with good streets and cheap traffic. If a debtor and creditor account were made out as to the saving in shoes, in

clothes, in the use of horses and carriages, in transit generally, and this cost contrasted with the rates, the balance will be in favour of smooth and clean streets.

SEWAGE IRRIGATION.—In conclusion Sir Robert says :—Broad irrigation with fresh sewage is the only economical mode of dealing with the fluid, as the entire volume may then flow over the land day by day without resting in the sewers or in tanks, and where this can be done disinfectants are not required, and, if used, they will only be injurious. In crude sewage there are minerals which will warp the land, and salts which will manure it. The weight of the solids to the fluid is only as 1 to 99—that is, about 1 ton of deposit to each 99 or 100 tons of fluid. In dry weather three-fourths of the fluid evaporates, and during hot dry summer weather the centre volume disappears, as no visible effluent leaves the irrigated land.

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#### AN INQUIRY INTO THE VALUE OF VARIOUS DISINFECTING APPARATUS—STEAM AND HOT AIR.

AT the request of the Municipal Commission of Hygiene of Copenhagen some very careful inquiries and experiments have been made in order to ascertain the real value of the various disinfecting apparatus. The experiments took some five months to carry through. Five varieties of apparatus, in use in the municipal hospital of Copenhagen, were put to the test, in addition to one of French manufacture. These represent all the principal forms suggested during the last few years. Ransom's apparatus disinfects by means of hot air; those of Ramsing and Seth by means of a mixture of hot air and steam. The cylindrical and rectangular stoves by Reck employ jets of steam, while the French system is based on the effects of steam under pressure. The experiments were made on wearing apparel and bedding as well as on microbe cultivations and the organisms of vegetable mould. The authors ascertained by these means that Ransom's apparatus, like those of Ramsing and Seth, were powerless to effect the destruction of any except microbes of feeble vitality. The only apparatus which gave satisfactory results were those of Reck and of Geneste and Herscher (the French) and the latter was by far the most reliable. While the French model effected complete destruction of all the germs present in twenty minutes, Reck's left a certain number living, even after an hour.

The latest invention brought to notice (Sanitary Record, August 15, 1888) provides for a current of steam passing through the chamber continuously, either with or without pressure, and at a rate of passage that can only be obtained by assistance; hence we are led to infer that a more perfect penetration is made through the materials under operation, and the desired results obtained in less time. But, beyond this, the new invention provides for the admission and penetration of hot air at equal speed, which will naturally leave the materials perfectly dry and free from that odour usually given to clothing exposed to steam; indeed the blowing of



warm air into them has a similar action to airing wearing apparel in the dry atmosphere on a fine day, the clothes being then left sweet and ready for immediate use. . . .

Although many successful experiments have been made by such high authorities as Dr. Koch and his coadjutors at Berlin, by Professor Max Gruber of Vienna, and Dr. Meyer at Utrecht, proving that steam at boiling temperature does effectually disinfect infected material, we are bound to notice the further advantage with greater rapidity in action of steam at a pressure showing a higher degree of temperature, as proved in the valuable experiments referred to.

The apparatus consists of a steel boiler with disinfecting chamber combined. When in use the lower part contains water, the supply being maintained by a small hand-pump, if the town pressure is not found sufficient. The top part of the casing contains the steam, and is connected by suitable valves and pipes to allow it passage into the disinfecting chamber. . . .

A special contrivance, called the exhauster, is fixed on the side, and arranged to complete a current of either steam or air to pass continually through the chamber. A small furnace is constructed on one side of the apparatus to supply the necessary heat to generate steam, and the products of combustion are conducted underneath the steel boiler. . . . to a separate chamber which is open to heat the atmosphere, and is thus supplied with pure air to be heated ready for penetration inside the chamber.

The apparatus has already passed the experimental stage and is in successful operation at Lowestoft and Fulham. The surveyor of Lowestoft reported on March 10th, to the council, that he had disinfected beds, mattresses, blankets, sheets, carpets, and wearing apparel of almost every description. with satisfactory results.

The Corporation of Leicester through their medical officer, Dr Tomkins, and experiments by Mr. J. Gordon, C. E., have thoroughly investigated various processes in use in different parts of England, and have recommended the adoption of Messrs Goddard, Massey and Warner's Disinfector (the one under notice) in preference to all others. The cubical capacity of the disinfecting chamber as erected at Lowestoft, Fulham, and Leicester, is about one-third more in capacity than most steam disinfectors in use.

The apparatus is arranged so that a division wall may be built at right angles in the disinfecting house and thus allow the clothing to be placed inside the machine in the infected apartment and withdrawn through the second door on the disinfected side. When required for rural districts it is constructed in portable form upon wheels; the weight is no more than can be taken by any ordinary horse.

A number of trials were recently made with the apparatus at the Leicester Fever Hospital, when the results were highly satisfactory. Some bedding was disinfected in the presence of the chairman of the Sanitary Committee. The steam was kept up at a pressure of 30 lbs., and registered a temperature of 261 ° F. inside the chamber, and the materials were taken out of the machine perfectly dry.

## DISSEMINATION OF INFECTION BY AIR.

THE following practical extracts are from a paper by Prof. Eben Duncan, M.D., Pres. Sanitary and Social Economy Section of the Glasgow Philosophical Society, read at the Annual Meeting of the Sanitary Association of Scotland, July, 1888 :—

I shall begin by dividing the contagia of communicable human diseases into two classes: 1. Those which are shed from the body of the patient in a dry form; and 2. Those which are shed from the body of the patient immersed in liquid matters.

The first class comprises all those fevers in which the skin is the seat of a copious eruption, such as small-pox, typhus fever, scarlet fever, and measles and erysipelas. Of this class of fevers I observe first, that, *ceteris paribus*, in direct proportion to the abundance of particles shed from the skin of the patient during convalescence is the danger from aerial infection in the vicinity of the patient. Secondly, I observe that in proportion to the minuteness of these particles shed from the body of the convalescent is the distance to which they are likely to be carried by air currents, and the area through which they may be disseminated. In the diseases I have named as belonging to the first class, a susceptible person is liable to be at once infected by breathing the air of the room in which the patient is lying.

There is, however, an exception to be made in the case of typhus fever. Experience in this disease has proven that if the infectious particles shed by the skin or breath of the typhus patient are exposed to pure currents of air through a distance of a few yards from the body of the patient they are so acted upon by the air as to lose their infective property. In the treatment of the other members of this group, small-pox, scarlet fever and measles, we do not find that the infectious particles shed from the skin of the patient are so easily robbed of their power of self-propagation. In these diseases the whole atmosphere of a house may become infective by the dissemination of infectious particles through the ordinary air currents of a house; and this even where there is such a measure of good ventilation that the standard of purity of the air, as regards its gaseous elements, is well maintained.

But even among these diseases there are differences as to the extent to which the infectious particles may be intercepted and prevented from being spread by the air currents throughout the atmosphere of a house. In the case of scarlet fever, by isolating a patient in the top flat, and arranging wet sheets at the door of the sick room so as to intercept the particles of infectious matter which tend to escape into the passages when the door of the sick room is opened, I have usually been quite successful in preventing the spread of that disease to the other inmates of the house, who were limited to the lower flat. But in measles I do not believe that any such precautions as I have found to prevent the spread of scarlet fever in a household will ensure the same safety in the treatment of a case in the upper flat of a dwelling in which there

is a direct communication by an open staircase between the flats. I can speak with some confidence on this point, because I have frequently had the opportunity of making a comparative trial, and failed in the measles to limit the disease to the first affected member of the family, and this even in cases where there was no communication between the members of the family in the early stage of the case before the occurrence of the measles rash.

I think the comparative fineness and lightness of the particles shed from the skin of the measles patient may account for this difference. These fine particles are not so readily intercepted. There are no facts on record which enable us to decide with certainty how far the infective particles of measles and scarlet fever may be carried through the air without losing their infective properties, but what I do know of the spread of these diseases leads me to believe that they speedily lose the power of infecting in the open air. There is no evidence on record to show that they can retain their virility for any distance in the open air.

In the case of small-pox we have facts recorded which justify us in saying that the infective particles shed from the skin of the small-pox patient can be carried by air currents not only throughout the whole atmosphere of a dwelling, but for considerable distances around the dwelling without losing their infective properties. The observations of Mr. W. H. Power on the influence of the Fulham small-pox hospital on the neighborhood surrounding it, seems to me to justify the opinion which he expressed in his reports to the Local Government Board that "There is evidence, alike from the experience of 1881 and of 1884, that small-pox has on occasions spread round the hospital to houses at all points of the compass in such a way that its spread cannot be accounted for unless its contagium has been conveyed through the general atmosphere." The facts recorded in these reports seem to prove that the infective particles of small-pox may be carried for at least a mile through the general atmosphere without losing their infective properties.

We shall now pass on to consider the second class, *i.e.*, those communicable diseases, the infectious particles of which are usually shed in the liquid or semi-fluid discharges from the throat, stomach, or bowels of the patient. The principal members of this class met with are: Typhoid fever, cholera, diphtheria and tubercular disease of the lungs.

The possibility of *aerial dissemination* of the infective particles, by air currents, in these diseases, depends on the drying up of the liquid matters and the dissemination of their contained particles in the form of dust. As long as the infective matters shed from patients suffering from such diseases remain in the liquid form, there is no danger of infection by breathing the air in the vicinity of the patient. . . .

The real reason why smells from fresh typhoid excreta do not produce disease is that the gases which produce these smells do not carry with them the infective particles; and the true reason why they do become infective after the lapse of time is

that it is only after the lapse of some time that such a mass of liquid matter as a typhoid stool can dry up so as to permit of the dissemination of its solid particles in the form of dust. We are also able to explain, in this way, the comparative rarity of infection of the nurses and attendants in cases of typhoid fever, and the well grounded confidence which the medical practitioner has in his ability to treat such cases in private houses without danger to the other inmates. The nature of the infectious discharges renders it necessary to remove them at once from the sick room. In my experience, it is only in cases where there is such profuse diarrhoea that the patient's linen and bed clothes become saturated with these matters that there is any real danger of infection to the attendants. In that case, unless these articles of clothing are at once removed and disinfected, infection is facilitated by the rapid drying up of the infectious material on these articles and its dissemination in the form of dust. I have never seen aerial infection from typhoid fever in a sick room except under such circumstances. From the same cause, there is danger in the vicinity of ashpits and privies, into which such discharges are thrown.

The observations which I have made with regard to typhoid excreta apply with equal force to the other members of this group, and the theory that it is only when dried that they have any chance of being carried by air currents explains the well known fact that when they appear in an epidemic form they are now always traced to a contaminated water supply or to a contaminated milk supply, and not to propagation by personal contact.

How far can the infective particles of these diseases be carried by air currents without losing their infectiveness? and how long can they retain their infectiveness after exposure to the air? These are very interesting questions, but except in the case of typhoid fever I do not know of any recorded facts on which to found even an approximate opinion. With regard to typhoid excreta, I know from my own observation that they can be frozen up for several weeks and still retain their infective properties. With regard to exposure to heat, there is a case recorded by Dr. Beecher in the appendix to the report of the Army Medical Department for 1868 which seems to indicate that the germs of enteric fever adhering to the walls and ceiling of an unoccupied room in the Fort at Gwalior in India, in which a person died of this disease, retained their infectiveness for at least six weeks. This case, the writer says, "Seems to indicate that the typhoid poison may adhere to walls, may be undestroyed in a month even with free ventilation, and is not rendered powerless by a high temperature."

There is, therefore, ground for believing that as in the case of dust particles of small-pox, so dust particles of typhoid excreta may be carried for long distances, possibly miles, by aerial currents without losing their infectiveness. There is also some reason to suppose that the dried particles of the contagious matter of cholera and diphtheria may be carried for long distances in

open air currents without losing their infective properties. . . .

A consideration of all the recorded facts of the dissemination of disease particles leads me to the conclusion :—

First, That as long as these particles are immersed in liquid media they are innocuous, unless the liquids which contain them gain access to water supply or to the food supply.

Secondly, That when such infectious matters, whether belonging to the first class, with dry germs, or to the second class, with wet germs, are emptied into a water closet and washed into the sewers, they are not likely to be carried back into the houses by the air currents of the sewers, even where the house drains and soil pipes are untrapped. I would guard myself, however, from asserting that such an occurrence may not happen, although in Glasgow there is a singular absence of proof that it does happen.

Thirdly, Where the house drains and soil pipes are properly trapped with water traps, no currents of sewer air can carry back infectious particles unless they force the trap, an occurrence which should be impossible in the case of properly constructed sewers and house drains.

In conclusion, I wish to guard myself from misconstruction, by stating that I am strongly of the opinion that it is a dangerous thing to breathe an atmosphere habitually tainted with sewage gases. It leads to more serious and lasting evils than the passing outbreak of a specific disease. I believe that the breathing of an impure atmosphere, although not the cause, is *one of the most important factors* in the production of the numerous organic degenerations, of which tubercular disease of the lungs may be taken as the type.

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## THE NEW NATIONAL QUARANTINE LAW.

### AN ACT TO PERFECT THE QUARANTINE SERVICE OF THE UNITED STATES.

**B**E it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That whenever any person shall trespass upon the grounds belonging to any quarantine reservation, or whenever any person, master, pilot, or owner of a vessel entering any port of the United States, shall so enter in violation of section one of the act entitled "An Act to prevent the introduction of contagious and infectious diseases into the United States," approved April twenty-ninth, eighteen hundred and seventy-eight, or in violation of the quarantine regulations framed under said act, such person, trespassing, or such master, pilot, or other person in command of a vessel, shall, upon conviction thereof, pay a fine of not more than three hundred dollars, or be sentenced to imprisonment for a period of not more than thirty days, or shall be punished by both fine and imprisonment, at the discretion of the court. And it shall be the duty of the United States attorney in the district where the misdemeanor shall have been committed to take immediate

cognizance of the offence, upon report made to him by any medical officer of the Marine-Hospital Service, or by any officer of the customs service, or by any State officer acting under authority of section five of said act.

SEC. 2. That as soon after the passage of this act as practicable, the Secretary of the Treasury shall cause to be established, in addition to the quarantine established by the act approved March fifth, eighteen hundred and eighty-eight, quarantine stations as follows: One at the mouth of the Delaware Bay; one near Cape Charles, at the entrance of the Chesapeake Bay; one on the Georgia Coast; one at or near Key West; one in San Diego Harbor; one in San Francisco Harbor; and one at or near Port Townsend, at the entrance to Puget Sound; and the said quarantine stations when so established shall be conducted by the Marine-Hospital Service under regulations framed in accordance with the act of April twenty-ninth, eighteen hundred and seventy-eight.

SEC. 3. That there are appropriated for the purposes of this act the following sums, out of any money in the Treasury not otherwise appropriated, for the construction, equipment, and necessary expenses for maintaining the same for the fiscal year ending June thirtieth, eighteen hundred and eighty-nine.

For the Delaware Breakwater quarantine: Construction of disinfecting machinery, steam-tug, warehouse, officers' quarters, and expenses of maintenance for the fiscal year eighteen hundred and eighty-nine, seventy-five thousand dollars.

For the quarantine station near Cape Charles, Va.: For the purchase of site, construction of wharf, repair of present hospital buildings and officers' quarters, disinfecting machinery, steam-tug, expenses of maintenance for the year eighteen hundred and eighty-nine, one hundred and twelve thousand dollars.

For the South Atlantic Station (Sapelo Sound): Construction of disinfecting machinery, warehouse, wharf, small boats, and expenses of maintenance for the year eighteen hundred and eighty-nine, thirty-eight thousand five hundred dollars.

For the quarantine near Key West: Purchase of site, construction of disinfecting machinery, warehouse, small boats, steam-tug, hospital buildings and officers' quarters, expenses of maintenance for the year eighteen hundred and eighty-nine, eighty-eight thousand dollars.

For the Gulf quarantine (formerly Ship Island), provided for by the act of March fifth, eighteen hundred and eighty-eight, in addition to the amount appropriated by the act approved March fifth, eighteen hundred and eighty-eight: For the expenses for the year ending June thirtieth, eighteen hundred and eighty-nine, fifteen thousand dollars.

Quarantine station, San Diego Harbor, California: For the purchase of and the construction of disinfecting machinery, warehouse, small boats, hospital buildings, officers' quarters, and for expenses of maintenance for eighteen hundred and eighty-nine, fifty-five thousand five hundred dollars.

For the quarantine station at San Francisco, California: Hospital buildings and officers' quarters, disinfecting machinery, warehouse and wharf, steam-tug, small boats, expenses for the fiscal year eighteen hundred and eighty-nine, one hundred and three thousand dollars.

For the quarantine station at Port Townsend: For the purchase of site, construction of disinfecting machinery, warehouse, small boats, hospital buildings and officers' quarters, for expenses of maintenance for the fiscal year eighteen hundred and eighty-nine, fifty-five thousand five hundred dollars.

Approved August 2nd, 1888.

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## ON SEWAGE DISPOSAL FOR WATER-CLOSET TOWNS.

ABSTRACT OF PAPERS READ IN THE SECTION OF PUBLIC MEDICINE  
AT THE ANNUAL MEETING OF THE BRITISH MEDICAL  
ASSOCIATION IN GLASGOW, AUGUST, 1888.

BY ALFRED CARPENTER, M. D.

IT having been determined that "The Disposal of Sewage" be one of the subjects for consideration at this meeting, I think it right not to allow the most correct way of dealing with sewage to be put out of sight, because of its simplicity. It is twenty-two years since I introduced a method of treating town sewage to the notice of an assembly of men of science, specially called to consider the subject of town drainage. I have repeatedly followed up the same subject at various meetings of scientific, medical and sanitary bodies, always dwelling upon the points connected with the utilisation of sewage on land by so-called "broad irrigation." At the International Congress assembled in London in 1881, I submitted in general terms a series of propositions for the consideration of the congress, and I now venture to re-state them for the consideration of this meeting in terms more explicit and detailed.

1. That the application of the sewage of a water closet town to land in close proximity to dwelling-houses is not injurious to the health of the inhabitants of those houses, provided the sewage be fresh; that it be applied in an intermittent manner, and the effluent be capable of rapid removal from the irrigated fields.

2. The judicious application of sewage to soil of almost any kind, if it be mainly inorganic, will satisfactorily cleanse the effluent water, and fit it for discharge into any ordinary stream, provided the area treated is not less than an acre for each 250 persons.

3. That vegetable products grown upon fields irrigated by sewage are satisfactorily and safe as articles of food, for both animals and man.

4. That sewage farms if properly managed do not set up either parasitic or epidemic disease among those working on the farm or among the cattle fed upon its produce.

5. That this immunity exists because the conditions necessary for the propagation and continuance of those disease germs which affect man and animals are absent, the microbic life on

sewage farms being antagonistic to the life of disease germs, the latter, therefore, soon cease as such to exist.

6. That sewage farms may be carried on in perfect safety close to populations. It is not, however, argued that the effluent water is safe to use for dietetic purposes.

7. That there is an aspect in sewage farming which shows that it is a wise policy for the nation to encourage that form of utilisation from a political economy point of view.

8. That to be financially successful such farms require that the rainfall be separated from the sewage ; the area large enough for alternate cropping, and the capital employed sufficient to insure a continuous and rapid consumption of the crops produced.

9. That if practicable sewage utilisation by surface irrigation should be, for financial reasons, within the area of its own watershed, and close to the populations producing the sewage, but it is not a necessity that it should be so, provided it be applied to the land within a few hours, not more than twelve, of its discharge, and that there is no arrest of movement for more than very short periods before it is so utilised.

1. The utilisation of sewage has been carried out on the same land consecutively for thirty years, frequently in a bungling manner, the area however, being increased as the increase of population required it. Commencing with thirty-six acres only in 1851, it was all but abandoned as an incorrect proceeding, because the quantity of sewage applied was in excess of the power of the soil to deal with it. Three hundred acres were then obtained about the time that I first became connected with the farm. These have been increased by new purchases as the quantity of sewage to be applied from increasing population rendered it absolutely necessary to enlarge the area of application, but the land irrigated for the first time thirty years ago still continues in use, and effects its object as perfectly as on the first application. The subsoil of the farm two feet below the surface shows very little alteration, and three feet below is not in any way contaminated by the continued application of sewage. The various crops grown upon the land take out the manurial properties of the sewage, and allow the soil to continue its purifying power even better than at first. To effect this, however, it is necessary that the cropping be incessant and that the land have occasional rest for a year from sewage application. The tendency of the repeated application of sewage to land is to silt up the lower portion of the subsoil and prevent it acting as a filter below the plough level, except for a short time. It follows, therefore, that the sewage must pass over the land rather than through it, and although intermitted downward filtration may purify the water, it will be temporary only, unless the soil is turned over frequently, so as to allow of its aeration. A sewage farm will bear deep ploughing better than other land, and grow larger crops in consequence.

2. The second great fact is that notwithstanding the very large price paid for the land at Beddington and Norwood, namely sometimes as much as £300 an acre, or more for some of it, and



a total cost of nearly £250,000, it has seldom been necessary to make more than a 2d. rate upon the parish to meet all the charges required to be met. The capital raised is now being paid off, but not lost, and in forty years from the last loan, the whole farm will be the freehold of the borough.

Let me take the propositions in turn 1. As to the effect upon health.

I showed that in 1881 the average death-rate for ten years for the Beddington and Wallington district was 14.3. I reproduce the tables with additions up to the present time. The deaths have not exceeded in number those in 1881, although the population has risen very considerably, and the births are twenty more than in that year. The rateable value of the district in 1861 was £11,700, in 1871 was £20,671, in 1881 was £41,616, and this year it is returned in the report to Survey County Quarter Sessions as £47,424, a tangible evidence of the increase of wealth and population around the sewage farm, whilst the zymotic death-rate last year is 0.5. only, and the average on the last seven years is only 1.2.

As regards its effect upon the health of the borough of Croydon, I showed in 1881 that the average death-rate for the borough was 17.9, and the zymotic death rate 2.79. In 1886 it was 14.5, and the zymotic death-rate 1.53. In 1887 it was 14.7 and 2.2 respectively, the dry summer increasing the diarrhoea among infants. . . .

5. The fifth proposition is an important one. It is difficult to prove a negative. I assert that disease germs are of two kinds, corresponding with active germs and resting spores, eggs hatched and growing, and unhatched. The hatched eggs are rapidly destroyed by the physical conditions under which they arrive at the farm; exposure to air, a lower temperature than that necessary for warm-blooded creatures, absence of pabulum, and presence of injurious gases soon destroy their life, but the resting spores (unhatched eggs) are more persistent. They certainly arrive on the farm, and it might be expected that they would do mischief, and so they do (and would) if the sewage is not immediately applied to the land. But then, if arrested, Nature comes to our rescue and destroys them by the sulphuretted hydrogen which is engendered as soon as putrefaction is rampant; but putrefaction destroys the chance of a satisfactory financial return from the use of the sewage, and it is not to be encouraged. As soon as the resting spores come in contact with the spongioles of plant life they are taken up with avidity, and taken in as food most energetically, much as human beings take in oysters when they get the opportunity. Some classes of plants, which I have presumed to name "carnivorous," among which I place rye grass, do assimilate these germs in the most rapid and satisfactory manner, so that no particle escapes their devouring power, and the effluent, as far as my observation goes, is absolutely free from their presence.

The corporation of Croydon have at this moment an estate of more than 700 acres, purchased for sewage farm purposes. Its

agricultural value has been raised five times over since it has been so utilised, its power to employ labour correspondingly multiplied to the advantage of the tradesmen and owners of cottage property in the borough, whilst the housewife has the choice of so much more milk and meat than would have the case if no farm had existed. Let these conditions be established in five hundred other districts in the kingdom, including London, and pauperism will be correspondingly lessened, because so much more labour will be provided, at least 40,000 agriculturalists kept on the land, who are not employed, the price of mill kept down, whilst thousands will have it who cannot have it now, and a mass of wealth added to that belonging to the country, which ought to recommend sewage farming to all political economists, who study production and its effect upon population.

Dr. C. R. Drysdale, in a paper, contended that the only rational and satisfactory way of treating the sewage of cities and restoring the rivers to their original purity was by the method now used in Berlin, Paris, Croydon, Birmingham, Nottingham, and elsewhere, that is, agricultural utilisation on suitable areas and soils. This was the only scientific way, and moreover the only method compatible with economy of food supplies. The Metropolitan Board of Works was a glaring instance of want of all plan in this question. The sewage farm at Paris at the plain of Gennevilliers had gradually become a most important experiment since the late engineer, M. Durand Claye, after studying sewage farms in England, abandoned the chemical plans as hopeless, and commenced to experiment with some acres with the fluid sewage. At present 600 hectares, or 1,500 acres, were irrigated with the sewage of Paris, and 20 millions of cubic metres of the sewage were annually used. The prosperity of the plain of Gennevilliers, which was cultivated by small proprietors, and also its salubrity, had been greatly increased; for, in the five years ending 1887, the population of the plain had increased 34 per cent, and the annual rental of the land increased from 90 to 450 francs per hectare. The Parisian authorities had been so convinced of the success of this experiment that the remaining portion of the Parisian sewage was soon to be utilised on about 3,000 acres at Achères, and there was also to be further irrigation by the sewage at the east end of Paris. The amount of market-produce obtained on the farms at Gennevilliers was quite remarkable, such as 40,000 heads of cabbages per hectare (16,000 per acre) and 100,000 kilos of beet per hectare (40 tons per acre). The peasants raised a gross value of from £120 to £400 per hectare from the land annually. Vegetables of all kinds grown for the Parisian markets, and in dry seasons a great portion of the supply was obtained on the carefully cultivated market-gardens. . . . The Berlin sewage farms employed 2,056 persons and were a great success. The cities of Berlin, Dantzig, and Breslau, with an aggregate of about two million inhabitants, had had excellent sewage farms for the last fifteen years. Berlin had now under sewage irrigation 16,657 acres on the north, north-east, and south of the city. The lengths of the

conduit-pipes used to convey the sewage to these farms from the various districts of Berlin varied from 964 mètres to 18,628 mètres. So perfectly healthy were the farms that convalescent homes had been erected on them. The persons employed on the farms consisted of 40 officials, 45 gardeners, smiths, and dairymen, 480 male and 125 female labourers, 966 workhouse hands, continually employed, and 360 men, women, and children, employed from April to October. In one week in October, 1787, 30,000 cwt of cabbage were sent by rail to Berlin from only one of the farms at Osdorf. In 1885 there were about 275 hectares under root crops, 91 under hemp, 1,625 under wheat and other cereals, 44 of peas and beans, 138 under fodder, 696 under potatoes, cabbages and, the like, 77 in nursery gardens, 1,267 under meadowland and pasture. On March 31st, 1886, the capital borrowed by the sewage irrigation authorities of Berlin appeared to have been £3,211,138 whilst Sir R. Rawlinson had said, at the Society of Arts in 1887, that the sewage experiment at London would cost ten millions sterling for no purpose and no benefit to agriculture. In 1887 Dr. Collingridge, the Medical Officer at the Port of London, said that the condition of the Thames was as bad as ever in spite of the chemicals ; and calculating the value of London sewage with a population of about four and a quarter millions, it had been said it should be worth a £1,000,000 a year and that it might raise fodder enough to feed 200,000 cows annually and thus give milk to London children. Mr. Bailey Denton, an engineer of great experience, and Colonel Jones, of Wrexham a sewage farmer himself, had a project to convey the London sewage to an island, Canvey island, 20 miles beyond Barking, where it might be partly utilised on 475,000 acres of land, and the pipe might be tapped on the way and irrigate thousands of suitable acres in Essex, etc. Canvey Island was about 35 miles from London Bridge, and it was calculated that, with a current of three miles an hour, the sewage would reach it in 12 hours.

Dr. T. J. Dyke, Medical Officer Urban and Rural, Merthyr Tydfil, said that in 1871 the Local Board of Health of Merthyr Tydfil entrusted to Mr. J. Bailey Denton, C. E., the employment of the best known method of disposing of the sewage from the residence in Merthyr, Dowlais, etc. Mr. Denton advised the adoption of the process of Dr. Edward Frankland, known as the Downward Intermittent Filtration process. A site was chosen at Troedyrhiw, three miles below Merthyr, on the west bank of the Taff River : there on a gravelly soil Mr. Denton formed filtration areas on sections of land, by deep drainage, levelling of surface, and provision of an efficient outlet for the effluent water. Each area or section was flooded with strained sewage for six hours, and allowed to rest, to drain, and to be aerated for eighteen hours. The work was completed in the spring of 1881, and thenceforth from one to three hundred thousand gallons of the strained liquid has daily been passed over and through the soil of the twenty acres of land so prepared. The surveyor, Mr. Harpur, and the superintendent, Mr. Baltram, concur in stating that the work has been

carried on without any injury to health ; that the land continues to act as perfectly as at the commencement in clarifying the sewage liquid, that the effluent water is perfectly clear and odourless, that there has been no "clogging" of the soil, no bogginess of the surface, and that during the year 1886 and 1887, the work of the farm has been carried on at a profit. The Board had, previously to the adoption of Mr. Denton's plan, obtained powers to take land situate nine miles from Merthyr for the disposal of sewage by wide irrigation. In 1872 and following years, the surveyor to the Board laid out 262 acres of land, and adapted the surface for this method of disposing of the sewage. The land was regularly drained, by drains cut three feet deep, the sewage allowed to flow along contour lines over the whole surface. The amount during the last four years, which was daily so disposed of, amounted to a million and a quarter gallons. The quantity was the outcome of the excess of sewage not utilised at Troedyrhiw, and the sewage from Merthyr Vale and Treharris, in the valley of the Taff from Aberdare, Mountain Ash, and Penrhiwceiber in the valley of the Cynon, west of Merthyr. Both the surveyor and superintendent of the farms state that this process is carried on without any detriment to health ; and with regard to returns for labour and *matériel*, that a fair profit has resulted. The total population on the several towns and villages connected with these sewage farms would be not less than 100,000. The total estimated dry weather sewage, 1,350,000 gallons daily, was disposed of on 282 acres of land, prepared by either the filtration or the irrigation method. The crops grown on the lands were, ordinary grass, Italian rye grass, potatoes, cabbages, mangolds, swedes, etc. These vegetable growths were perfectly healthy and sound. . . .

Dr. Wm Whitelaw, Medical Officer Kirkinilloch, said : The works at Dryfield consist of a storage tank, a distributing and screening tank, and the various channels and conduits connected therewith, and several filtration beds, covering at present an area of nine acres. The storage tank referred to is situated at the end of the low-level sewer, and holds 107,000 gallons. The principal object of the tank is to store the sewage passing down the low-level sewer during night, and in this way to restrict the operation of pumping to the ordinary working hours. With sufficient machinery the pumping can be limited to two or three hours in the morning and two or three hours in the afternoon, leaving the tank empty to receive the night flow. . . . After passing through the screening tank, the sewage will be directed by a number of sluices into the various distributing channels, and by them carried to the filtering beds. These consist of twelve plots of ground, averaging three-fourths of an acre of area in each, there being four plots in the length, and three in breadth of the ground occupied. Each plot has had its surface brought to a perfect level, and as the ground originally sloped slightly to the river Kelvin, the plots in each division rise in terraces one above the other. The main sewage-carrier is laid along the upper edge of the filtration area, and branch carriers are laid down between each set of plots, provided

with valves opposite the end of each, so that the sewage may run on to the surface of any one or more as required. The whole ground, when finally prepared by spade-work, forms a series of ridges and furrows. The sewage flows along the furrows, which retain solid matter; and a drain laid at a depth of fully six feet is laid along the top of each terrace, to intercept and carry off the effluent. Here the effluent is small and unobjectionable. These subsoil drains lead to a main outfall discharging into the Kelvin. . . .

Dr. Littlejohn gave a description of the disposal of the Edinburgh sewage, and he pointed out both the northern and southern watersheds had been drained into iron pipes and the sewage carried out to sea, while the old town had for the last two hundred years disposed of its slop water, and ultimately of its sewage, on a sandy waste now well known to sanitarians as the Craigtinny Meadows. This sewage farm was so well managed financially, as frequently to have a revenue of £40 per acre, but at the same time was laid out in a most imperfect manner, and in the hot months became a source of nuisance from the bad odours. Such complaints could easily be removed by a little attention to the manner of disposal of the sewage. These meadows had no injurious effect on health of the sparse population of Edinburgh. He could not but regret that so much valuable manurial matter was cast into the sea when the evidence as given by previous speakers was so strong of the advantages to be gained from the direct application of the sewage to the land.

Dr. N S. Davis (Chicago, U. S. A.) said Chicago had made investigations to carry the sewage of 750,000 inhabitants through canals into the Illinois River and thence into the Mississippi River. Several years since the city spent 3,000,000 dollars to deepen the Illinois and Michigan Canal to carry the sewage into Illinois River but it was found to accomplish the work very imperfectly, while it so contaminated the river water that fish perished, and the inhabitants complained more or less for 100 to 150 miles distant in the central part of the State. Yet at times much of the sewage was washed into the lake, and contaminated the water which forms the drinking supply of the city. In order to get over the difficulty the city tunnelled for three miles under the lake to take the water from a part of the lake still uncontaminated. All the inquiries were still being directed to methods of disposal into the rivers and water-courses which Dr. Davis did not believe safe. The only reliable method, in his opinion, was to return the manurial matters back to the soil. One suburban town called Pullman, owned by Mr. Pullman, of sleeping-car fame, disposed of its sewage by irrigation. It was carried out three miles before being applied to the soil. This experiment of Mr. Pullman had been quite successful. Dr. Davis advocated that all the sewage of the large American cities should be disposed of on the available lands to be found within from ten to forty miles of their borders.

Lt Col. ALFRED S. JONES, C.E., expressed his pleasure in hearing the President's paper regarding Edinburgh, as he (Colonel

Jones) had been appealing to the Craigentenny Meadows for the last twenty years as the parent of sewage farming. He quoted the case of Wrexham, a town of 12,000 population, which has utilised its sewage, for the last sixteen years within half a mile of the town. He had been tenant of the farm with the obligation of purifying the sewage and gained the £100 prize offered by the Royal Agricultural Society of England for the best managed sewage farm in 1879. All his accounts for seven years were published in the Journal of that Society. Wrexham was now so satisfied with the sanitary results of sixteen year's irrigation at its gates, that it was not afraid to purchase 200 acres two miles lower down the brook which led the effluent into the River Dee.

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### COMMUNICABLE DISEASES COMMON TO MAN AND ANIMALS.

NO subject engaging the attention of physicians or others interested in the public health, at the present time, is of greater importance than this one, of the communicability of diseases from domestic animals to the human family. As the British Medical Journal recently stated, "that domestic pets are capable of taking and spreading infection has been amply demonstrated. The same may be said of domestic animals which are not pets;—from cows, especially, and from horses. And that animals are not only capable of contracting many of the infectious diseases common to mankind and of communicating them to each other, but that they may communicate the same to man, seems also to be very clear. While it has been long known that hydrophobia and glanders, and suspected that the tubercular and some other diseases, are transmissible from animals to man, it appears it is only recently believed and fairly demonstrated that the same is the case with regard to scarlet fever and diphtheria.

With the view of bringing the subject before this Association and perhaps obtaining further evidence bearing upon it I have brought together a few recently published facts which may also prove of interest and value to the Association.

A SORE THROAT EPIDEMIC FROM MILK SUPPLY.—The following is a condensed report of an epidemic of sore throat in Edinburgh and its relation to the milk supply, from the British Medical Journal of July 9 last:—

At a meeting of the Edinburgh Medico-Chirurgical Society, in June, Dr. G. Sims Woodhead and Mr. J. M. Cotterill read a paper on a curiously limited epidemic of sore throat, and suggested a relationship with the milk-supply. Mr. Cotterill was called to attend successively a large number of cases of sore throat occurring in an educational institution in the city. The grouping of the cases raised the suspicion of infection from a common source, and, after careful exclusion, Mr. Cotterill came to the

conclusion that the mischievous factor was to be found in the milk-supply. This was accordingly suspended, when the sore-throat epidemic quickly disappeared. When the milk was recommenced, sore throats of a similar character appeared again. Then all the milk was boiled before use, when the epidemic similarly yielded. Dr. Woodhead's attention was accordingly called, and he instituted a careful examination into the condition of the cows from which the milk-supply in question was obtained. Most of the animals showed unmistakable signs of cow-pox in the scab stage. One cow, which had been separated from the rest as specially healthy, and whose milk was devoted to the use of a hand-fed child, showed similar appearances. On inquiry, it was discovered that the child too, as well as other persons who had partaken of the special milk, suffered likewise from a similar sore throat. The clinical evidence thus appeared strongly to support the view that the milk was the medium of infection from the diseased animals. Dr. Woodhead then undertook a series of cultivations and inoculation experiments. He examined the matter from the teats of three of the diseased cows, and found streptococcus pyogenes in all; further, a very small bacillus in the discharge from two, and several other organisms in that from one. In the matter from the tonsils he discovered the streptococcus pyogenes, the slender bacillus, and a very small micrococcus. In two instances there was found, in addition, the short thick bacillus. By cultivation from these and from the milk, no less than fourteen distinct organisms were separated. Of these four were common to the milk, to the discharge from the sores, and to the tonsils, while seven were found common to the milk and the sores.

DIPHTHERIA INTERCOMMUNICABLE BETWEEN CHILDREN AND CATS.—In a report on a recent sustained prevalence of diphtheria in Enfield, England, (Sanitary Record, June 15, '88), Dr. Bruce Low, of the Medical Department of the Local Government Board, incidentally states that during the continuance of the epidemic cats were observed to suffer in considerable numbers from illness; and in December, 1887, and January, 1888, there was a large mortality among those animals, so much so that the attention of the dust contractor was directed to it. He stated that never in his previous experience had he seen so many dead cats in the dust heaps. Some households, seeing their cats ill, destroyed them. Though there were no known cases of diphtheria occurring in the practice of the veterinary surgeons at Enfield, yet they saw many cases of 'influenza' at this time among animals. The following is an illustration of the possible connection between diphtheria in children and in cats: A little boy was taken ill with what turned out ultimately to be fatal diphtheria. On the first day of his illness he was sick, and the cat, which was in the room at the time, licked the vomit on the floor. In a few days (the child meanwhile having died) the animal was noticed to be ill, and her sufferings being so severe and so similar to those of the dead boy, the owner destroyed her. During the

early part of its illness this cat had been let out at nights in the back yard as usual. A few days later the cat of a neighbor, who lived a few doors further off, was noticed to be ill. It had also been out in the back yards at night. This second animal, which, however, recovered, was the pet and playfellow of four little girls, who, grieved at the illness of their favorite, nursed it with great care. All four girls developed diphtheria, their mother being convinced that they got it from the cat; and, indeed, no other known source of contact with infection could be discovered. It is easy to imagine cats catching an infectious illness like diphtheria, says the Sanitary Journal, when we remember how often milk and other unused food from the sick room is given to the cat, or by some people thrown out in the back yard for the benefit of the neighbor's cats, if they have none of their own.

DIPHTHERIA FROM FOWLS.—In the HEALTH JOURNAL of June last there were some notes of cases from an article in The St. Louis Courier of Medicine, from which it was very apparent that this disease may be communicated from fowls and turkeys, to which I shall here but briefly allude. A physician, named Menzie, observed at Naples an epidemic of diphtheria which attacked the family of one of his colleagues. Of five children four were attacked and died; then the epidemic extended to others. He attributed this epidemic to the water, washed from the flat roofs of the houses on which flocks of fowls, turkeys and pigeons lived and roosted, which the patients drank. The servants had been forbidden to use this water for cooking or drinking purposes, but disobeyed. The one of the five children which did not take the disease, did not drink of the water. A boy, aged seven years, living in a house opposite, drank water from the same well, and was also attacked with diphtheria and died. In another house there was a large dove-cote; all the ordure from its occupants found its way into the well. Among the dwellers in that house a lady and four of five children died.

An epidemic is recorded by one Parlinis which presents almost the conditions of a laboratory experiment. It ravaged an island on which there had previously been no case of diphtheria; it was brought there by sick turkeys which died of diphtheria clearly and well developed; some days later diphtheria attacked the children and rapidly extended over the whole island. But here it was the water, which served as the carrier of the virus, not the air. The epidemic lasted five months and of a population of 4,000 attacked 125, 36 of whom died.

Much evidence has been published in medical journals and in this JOURNAL showing the probability that this disease not infrequently arises from manure heaps; from the infection, it would seem, of animals.

INTERCOMMUNICABILITY OF SCARLET FEVER.—Relative to scarlet fever and what has been called the Hendon Cow disease, the latest appears to be that published in the HEALTH JOURNAL of June, the chief points of which I shall here but briefly notice:

Dr. Buchanan in the Annual Report of the Medical Officer of



the Local Government Board, of Great Britain, for 1887, thus formulates the present evidence on this point: 1. The disease in man and in the cow alike is characterized by closely similar anatomical features. 2. From the diseased tissues and organs of man and cow alike the same micrococcus can be separated, and artificial cultures can be made from it. 3. These subcultures, no matter whether established from man or cow, have the property, when inoculated into calves, of producing in them every manifestation of the Hendon disease, except sores on the teats and udders; no doubt for the reason that the milk apparatus is not yet developed in calves. 4. But—and this I learn from Dr. Klein's later observations while this report is in preparation—the subcultures made from human scarlatina and inoculated into recently calved cows can produce, *in those cows*, along with other manifestations of the Hendon disease, *the characteristic ulcer on the teats*; ulcers identical in character with those observed on the Hendon farm. 5. The subcultures established either from the human or the cow disease, have an identical property of producing in various rodents a disease similar in its pathological manifestations to the Hendon disease of cows and to scarlatina in the human subject. 6. Calves fed on subcultures, established from human scarlatina, obtained the Hendon disease. 7. Children fed on milk from cows suffering under the Hendon disease obtained scarlatina. "The above combine," says Dr. Buchanan, "to form a mass of evidence to show that the Hendon disease is a form, occurring in the cow, of the very disease that we call scarlatina when it occurs in the human subject."

Dr. J. B. Russell, the able Medical Officer of Health, for Glasgow, who visited this continent two years ago, has issued a report on an outbreak of scarlatina at Garnethill which bears very strongly on the same question. After a careful house-to-house visitation of the district he found that there were ninety-five cases in all, and that each of these cases obtained milk from the one dairy. All the cases had fallen ill since March 15th. The milk was, therefore, the obvious medium of infection. Further investigation led to the suspicion that the milk in this dairy had come from a farm at which there had been a case of scarlet fever. The son of a farmer who brought in the milk was seized, on March 23rd, with the first symptoms, and the byreman, on March 24th, was seized with sore throat. No other person had been ill. With the view of answering the question: Did the milk derive its infection from the cow? as in the Hendon case in 1886, Dr. Russell and Mr. McCall, veterinary surgeon, carefully inspected the stock. Two cows were found with scabbed sores on the teats. One of these was miserably thin and mangy-looking, casting its hair and skin; the other was in good condition, not casting its hair, and the sores on the teats bled freely. These cows were removed to the Veterinary College for observation. A calf fed on the milk of those cows was almost at once seized with a highly febrile illness, which nearly killed it, but from which it is now (May 5th, 1888, —Brit. Med. Jour.) recovering with loss of hair and copious casting of the skin.

#### INTERCOMMUNICABILITY OF TUBERCULAR DISEASE.

Altogether the most important part of this subject is that which relates to the communicability of tubercular diseases between animals, especially cows, and the human family; and this because of the great prevalency and fatality of that form of the disease termed consumption, and the universal use as food of the milk and flesh of the horned cattle.

A few months ago a good deal of publicity was given in two numbers of the HEALTH JOURNAL and also in other publications to extracts which I collected from numerous authorities in Great Britain, the Continent of Europe and in the United States, showing the identity of the disease in animals and man, its frequency in both milch cows and slaughtered carcasses for sale as food in market, its apparent increase among cows, and its probable frequent communication to the human organism either with the flesh or milk of the diseased animals.

In one of these extracts, I may here just mention, from an exhaustive paper by Dr. E. F. Brush, in the New York Medical Journal, the author made the assertion that, in his "candid opinion," tuberculosis in mankind "is all derived from the bovine race," and he sustained this opinion by strongly worked out evidence. In another, from the last Annual Report (for 1887), of the New Hampshire Board of Health, Prof. D. E. Salmon, D. V. S., of the Bureau of Animal Industries in this country, is reported as believing that tuberculous milk is an exceedingly prolific source of consumption in the human family. And "that there are clinical observations proving the transmission of tuberculosis from animals to man through the use of tuberculous milk." In the report of the Bureau of Animal Industries for 1884, it is stated that certain herds were supplying New York City with milk containing twenty, thirty, or even fifty per cent. of animals affected with the disease. In some districts of New York can be shown large herds with ninety per cent. the subjects of tuberculosis, and in this connection it is asserted that twenty-nine per cent. of the adult males dying in New York City are tuberculosis.

Since the publication of these numerous extracts, I have not observed much literature upon the subject. One remarkable case has been recorded by Denune, of Berne, however, in the Medical Press and Circular, in which an infant became infected with tuberculosis through the milk which had been obtained from a phthisical cow. The details of the case are as follows: An infant, aged four months, belonging to a family whose history was absolutely negative in regard to tubercular affections, died of tuberculosis of the mesenteric glands, a fact which was confirmed at the post-mortem examination. The glands alone contained the characteristic bacilli; the latter was not even to be detected in the intestinal mucous membrane, and no bacilli were found in any other part of the body. The child was fed with the milk of a cow which was especially kept for the purpose. The cow for the purposes of examination and inquiry was slaughtered, and a careful post-mortem made of its carcass. The left lung and pleura

of the animal were found to be studded with tubercle, and in the tubercular nodules bacilli were easily found. The milk was then submitted to a minute investigation, but bacteriological examination at first yielded negative results. Finally, however, tubercle bacilli were detected in portions of the liquid expressed from the deepest parts of the mammary gland. As stated in the journal just mentioned, the case is an important one from several points of view, and claims attention by reason of its bearing upon the so-called hereditary transmission of tuberculosis. If, instead of a human infant, a calf had in a natural manner fed itself with milk from its mother's udders, we can hardly conceive otherwise than that the calf would have similarly become infected with tubercle. Assuming such to have occurred, the case would obviously have been regarded as one of the hereditary transmission of tubercle. But taking the supposition that a woman suffering from phthisis suckles an infant, there seems to be no reason why the same result should not occur, and why, like the infant and the cow, to which reference has been made, the mother should not transmit the bacilli by means of her milk to her offspring.

As you all probably know, two important meetings have recently been held in Europe at which this subject has been discussed at great length: namely, the congress of physicians and veterinarians in Paris, July 25 to 31, and the annual meeting in August, in Glasgow, of the British Medical Association.

#### THE PARIS CONGRESS ON TUBERCULOSIS.

A large number of physicians and surgeons were present from almost all over the world, including a number from the United States, of whom Dr. Jacobi and Dr. Page were named as honorary members. M. Chauveau was elected President and M. M. Villemin and Verneuil Vice-Presidents: a peculiar fitness; for Villemin may be said to have been the pioneer in researches of this kind, having been the first to prove the infectiousness of tubercle; while Chauveau was the first to confirm Villemin's discovery, to demonstrate the transmission of tubercle by the digestive passages, and to show the differences which exist between true and false tubercle.

M. Chauveau in his opening address, reviewed the advances made in the study of tuberculosis in modern times, referring especially to Villemin's views, which had been so strikingly confirmed by Koch's discovery.

M. Verneuil followed with a short address in which he referred to the scientific co-operation of physicians and veterinarians, as exemplified in this meeting, and hoped that it would be but the beginning of a series of works in which the two professions would be united in doing battle to a number of diseases common to man and the lower animals.

M. Cornil opened the scientific work of the Congress with a communication on tuberculosis of the mucous surfaces. One of the most important facts which had been proven by experiment is that the tubercle bacillus may penetrate the unbroken mucous

membrane. This had been shown in the case of the lungs and of the intestinal tract.

M. Nocard read a paper on the dangers from the use of the flesh and milk of tuberculous animals. It was correct, he said, to assume that the flesh of tuberculous animals was always capable of exciting the disease in those who ate it. That there was some danger in eating such meat he admitted. It was wise to guard against all means of infection, but it was also necessary to proceed with caution, for immense interests were concerned in raising cattle and in preparing food for the market.

M. Arloing read a paper advocating the forcible seizure of tuberculous animals. He did not agree with M. Nocard that the danger of infection through the flesh of tuberculous animals was slight. It was true that the bacilli did not long preserve their virulence in muscular tissue; but it was fair to suppose that a certain number existed in the flesh at the time the animal was killed, and they then would retain their vitality in the dead meat, and be capable of infecting those who ate of it. The temperature to which beef was ordinarily exposed in the process of cooking had been shown to be insufficient to destroy the bacilli. Experiments made by feeding diseased meat to guinea pigs showed that twenty per cent of the animals became tuberculous.

M. Baillet deprecated the exaggerations of the contagionists, and did not believe in the wholesale destruction of the meat from tuberculous animals. If an animal was fat and in good condition the flesh could be eaten with impunity even though there were tubercular deposits in the lungs, pleura, and lymphatic glands.

M. Butel thought that, in a matter of such vital importance to the well-being of the community no considerations of a commercial nature should be allowed to bias the judgment of the speakers. He believed that the risk of infection from diseased meat was too great to allow of any compromises or fine distinctions. All meat from tuberculous animals should be seized, but it was only just that the government should indemnify the owners of the sacrificed cattle for their loss.

M. Grissonnanche read a paper on the early diagnosis of pulmonary tuberculosis in cattle. His experience as a veterinary surgeon, practising in the country, had led him to regard the early diagnosis of phthisis in cattle as a much more easy matter than that of glanders. Pulmonary tuberculosis is characterized from the first by tumefaction of the retropharyngeal glands; the inspiratory movements are irregular; a harsh friction-sound is heard on auscultation, resembling somewhat the sound produced by rubbing the thumb over a tambourine. The cough is short and not easily provoked except by sharp percussion on the thoracic parietes, a procedure which evidently causes pain to the animal. The disease is met with most frequently in cattle living together in herds, hence the necessity of its prompt recognition, and of the isolation of the affected animal.

M. Veyssièrè opposed strongly the views set forth by M. Baillet, and hoped that the Congress would not endorse them.

He thought the distinctions made between localized and generalized infection were too fine to be followed by the ordinary meat inspector, and existed upon the rejection of any infected animal, whatever its general appearance of health may be. He had seized a very fat and apparently well-conditioned cow on account of a local tuberculosis, and had injected some of the juice expressed from the meat into two rabbits. Both animals died, and an examination showed the presence of tubercular alterations in the lungs and liver.

M. Moule referred to the danger of infection by eating the flesh of tuberculous poultry, a matter which seemed to have been in the discussion hitherto. His observations had led him to believe that domestic fowls were very frequently the subject of tuberculosis, the disease often involving the abdominal organs.

M. Thierry said that the inspection of meat in all the larger cities ought to be most vigorous; while in the country such precaution was less necessary.

Mr. Robinson of Greenock, Scotland, said that from an experience of fourteen years as meat inspector, he had come to the conclusion that tuberculosis in animals is comparatively rare, but that when it does exist, even in cases in which it seems to be most limited, a more careful examination will generally show the presence of glandular involvement. He urged upon the Congress to pass some very strong resolutions against the use of the flesh of diseased cattle, for he did not think it possible to decide safely, in case of tuberculous animals, between those that were fit to be eaten and those that were not, and it was necessary therefore to exclude all.

M. Guinard called attention to the danger which existed in the practice of drinking fresh blood at the abattoirs. He had seen a lady drink the blood from a fine-looking animal which however, was found afterward to be diseased and was condemned.

A resolution was proposed to the effect that, in the opinion of the Congress, all animals affected in any degree with tuberculosis should be seized and condemned as unfit for food. This resolution was carried with only three dissenting votes.

M. Degive made some brief remarks on tuberculous and vaccination. He said that it was the practice in Belgium to kill all the calves from which vaccine had taken, and to reject the latter if the animal was found to be tuberculous.

The president said that this was certainly an excellent rule to follow, but one could easily exaggerate the dangers to be apprehended from this source.

M. Hannot, one of the most distinguished of the *agregé* Professors of the Paris School of Medicine, showed that there is a tubercular cirrhosis of the liver, and that many cases of tubercular peritonitis, called ascitic, are simply caused by this sclerosis of the liver. The question of heredity of tuberculosis was studied; but nothing new stated, if we except that it was found to be rare in animals. The newly born of tubercular cows do not seem to have the mother's disease, but acquire it later probably from the

milk. M. M. Strauss, and Wurtz (son of the late Prof of Chemistry) had studied the action of the gastric juice on Koch's bacillus and found that it does not destroy the power of the bacillus, and M. Butel thought tubercular infection was more often produced by the way of the digestive tract than by the pulmonary one.

M. Robinson, of Constantinople, sent a communication on pulmonary phthisis in Asia Minor. Notwithstanding the fact that the inhabitants of this country lived much in the open air, and under the best hygienic conditions, tuberculosis was very prevalent, and ten per cent. of all his patients were suffering from this disease. The natives recognized the contagious nature of the malady and always destroyed the articles used by the sick. The frequency of the disease, there could be no doubt, was owing to the free consumption of milk and of nearly raw meat by the natives.

M. Cartier recommended the flesh of the sheep or goat as most suitable to be eaten raw, as these animals very rarely suffered from the disease. If it was considered desirable for a patient to drink fresh blood, that coming from these same animals should be chosen by preference. The writer had himself drank sheep's blood, and said that with his eyes shut, he would have supposed that he was drinking milk fresh from the cow. There was nothing in the least disagreeable in its taste.

M. Chantemesse presented the results of experiments, to determine the persistence of tubercle bacilli in river water. It was found that the micro-organisms were still present at the end of seven weeks. Pieces of tuberculous tissues were placed in the bottom of a flask in which was maintained a stream of running water of a temperature of about 60° F. It was found that the micro-organisms were still active at the end of six weeks. In stagnant water the virulence was preserved for seventeen or eighteen weeks.

"Hereditary," "Uterine" and "Family" Tuberculosis were discussed, and also the possibility of the bacillus passing through the healthy placenta, and numero's other points of less interest to the sanitarian. The German "air" treatment was approved of, and the Congress closed to meet again in two years: The following propositions being first unanimously adopted.

I. That there should be placed in the *attributions* of the hygienic counsels (Boards of Health) on the questions relative to the contagious diseases of the domesticated animals, comprising those which do not seem, for the present, to be communicable to man. To vaccinia, glanders, rabies, anthrax, tuberculosis, there might in course of time be added other common infectious diseases requiring equally a common protection.

II. There ought to be carried out by every possible means, comprising compensation to the individuals interested, the general application of the principle of seizure and total destruction of the flesh of all tubercular animals, no matter to what extent the specific lesions found in these animals exist.

III. Printed simple instructions ought to be profusely circu-

lated in the towns and in the country, indicating the means to be employed to avoid the dangers of infection from tuberculosis by food, particularly milk, and how to destroy the virulent germs in the excretions on clothing, etc., by consumptive people.

IV. All dairies should be submitted to a special surveillance, that it may be ascertained that none of the cows are affected with contagious diseases communicable to man.

#### THE SUBJECT AT THE BRITISH MEDICAL ASSOCIATION MEETING.

At the meeting last August of the British Medical Association, in Glasgow, in the section of Public Medicine, in discussing this same question, the communicable diseases of men and animals, Professor Walley said, the subject under consideration was, he thought, one of the most important that at the present time claimed the attention of sanitarians.

In reference to tuberculosis, in 1872 he had read a paper on the subject in that city. In 1879 he wrote in a book entitled "the Four Bovine Scourges." Since that time he had, with other members of the profession, frequently drawn attention to the dangerous nature of the disease, and had urged that it should be dealt with as a contagious malady. He might say that up to the discovery of the tubercle bacilli by Koch, the relative position of tuberculosis was not defined; but personally, he had never, since he gave his attention to the subject, entertained the slightest doubt as to the nature of the malady, and before 1872 he had considered it as a specific disease. There was, in his opinion, no disease that claimed more earnest attention than this, as it was greatly on the increase, both in cattle and poultry, and thousands upon thousands of the latter were yearly sacrificed to this fatal malady, and what was rather remarkable was the rapidity with which, in view of their high temperature, it ran its course in birds. A few weeks ago he had occasion to superintend the slaughter of nine cows from a byre in Edinburgh, in which pleuro-pneumonia had broken out, and out of the nine there were five affected with tuberculosis, two of them being as bad cases as he had ever seen; on a more recent occasion he had to slaughter another lot of dairy cows, and the result was proportionally the same. The disease was propagated in a variety of ways—by ingestion, by inhalation, and by inoculation—and there were good grounds for believing that it might be propagated by the medium of the eggs of poultry. Several years ago he had publicly directed attention to a case in which the malady made its appearance in a poultry yard near Edinburgh, under such conditions as to point undoubtedly to its origin through the medium of eggs. Only a few weeks ago several chickens were sent to him by Mr. B. Freer, M.R.C.V.S., of Uppingham; these chickens were about three weeks old, and every one of them presented the microscopical characters of hepatic tuberculosis; but in order to render his opinion more certain he asked his colleague, Professor MacFayden, to make a microscopical examination of the organs, and the result was confirmatory of his own conclusions. In reference to the communica-

bility of the disease from animals to man, while they did not possess such positive or direct proof as they would like, there was a vast amount of indirect proof available on the point. In 1871, when he first went to Edinburgh, he lost a child from mesenteric tuberculosis, under such conditions as to point to the milk as the source of contamination; within the past few years, one of the officials of the Veterinary Department of the Privy Council had lost a child, also in a similar manner, and, had Dr. Fleming been present, he would doubtless have related many similar instances to them. Probably they were all acquainted with the disease from which numbers of surgeons had suffered, and from which he himself suffered, known as pathologist's wart, and that the disease was generally thought to be due to an irritant introduced into the tissues by accident in making *post-mortem* examinations. It was now generally understood that this disease was of a tuberculous nature, and in his own case the originating wound was produced while in the act of dissecting the tuberculous mediastinal glands of a heifer; he supposed that a microscopical examination of the tissues would settle the matter one way or another. The practical question which in his view should be considered by this and similar bodies was its legislative aspect; and he thought that before that meeting came to a close, some expressions of opinion should be forthcoming on this point. As matters were at present, they were in this position, that neither Veterinary or any other inspectors were empowered to deal with live animals manifestly suffering from the disease either in byres, fairs or markets. There was absolutely no legislative power given to them; they were helpless in the matter. Tuberculous, he thought, was one of the greatest pests of man, as it was of animals, and he had no hesitation in saying that more animals had died from this malady than from all the other zymotic diseases put together, and, looking at the great danger that existed of its transmission to man, he thought that this and kindred bodies should do all in their power to strengthen the hands of the Legislature in initiating suppressive legislation.

Dr. Farquharson, M.P., had much pleasure in seconding the resolution. After the recent lectures by Dr. Sims Woodhead and the able lecture by Principal Walley, it seemed certain that the bacillus of bovine and human tuberculous were identical, that it could be transmitted through the milk from tuberculous udders, and that evidence went far to show the probability of its communicability to man. Under these alarming circumstances, he held that it was the duty of the Government to deal seriously with the subject, with a view of including tuberculous among the diseases scheduled under the Contagious Diseases (Animals) Act. Mr. Ritchie, of the Government Board, had recently assured him, in reply to a question, that this was now under the consideration of his Department, and the expression of opinion from such a representative meeting could not fail to strengthen the hands of the Board.

Dr. Alfred Carpenter said, as to tuberculosis, it had been his



duty to hear evidence brought before him when an application was made for the condemnation of certain tuberculous carcasses, that if such meat was prohibited it would be impossible to feed such populations as London. This evidence was given by one of the principal inspectors of the largest meat market in London. This evidence was very staggering, for the inspector stated that sometimes as much as 80 per cent. of the meat exhibited for sale was so affected. The second point he wished to draw attention to was the difficulty of getting upon the real causes which lead to the spread of scarlatina. Dr. Carpenter then detailed the particulars of an outbreak which he had investigated, in which those children only who attended a particular school became affected, although the school had been closed for several weeks. The disease did not spread to other children though living in the same house, unless those children had been to the school in question. This immunity was proved to have arisen from the fact that no house in that district had any direct connection with the sewer except the school-house, and those children only who had inhaled the air of the school-room were liable to take the disease.

Prof. McFayden said: With reference to tubercle, he considered it had been proved that the human and bovine diseases were caused by the same bacillus. His own experience enabled him to affirm that bovine tuberculosis was very common, though he did not believe that the proportion was anything approaching 50 per cent., as some of the previous speakers had said. But admitting these points, it still remained to inquire whether human tuberculosis was often excited by the ingestion of tubercular flesh. He thought that only a very small proportion of cases had that origin, for he believed that abdominal tuberculosis was comparatively rare in human adults, and yet in feeding experiments on the lower animals, the abdominal viscera were almost invariably affected in some degree.

WHAT ARE THE REMEDIES?—I will conclude by drawing attention, in a brief manner, to the necessity for some special preventive measures being more generally adopted, with the view of lessening the frequency of this disease in cows and other domestic animals.

Acts of Parliament do not yet in any way or in any country reach the tubercular diseases. In Great Britain efforts have been made during some years past to have an act passed for including the disease in the general "Contagious Diseases (Animals) Act," and doubtless this will soon be carried out, and the question has been referred to in the Agricultural Committee of Parliament in this country. But, in the words of Dr. Littlejohn, Medical Officer of Health for Edinburgh, Scotland, in a most valuable Official Report, a synopsis of which is in the Sanitary Record for July, '88, words which apply too, to this continent, the delay in action of this kind is chiefly because bovine tuberculosis is essentially a chronic disorder, which may last for years, and which is usually very difficult to detect in its early stages, differing thus

widely from cattle plague, pleuro-pneumonia, or swine fever, all of which are acute diseases, running a rapid course, and easily recognized. However, though the owner of a cow may long remain in ignorance of her having tuberculosis, when emaciation sets in, as it always will sooner or later, he becomes alarmed, and the animal is hurried to the shambles before its leanness becomes so marked as to render its carcass unmarketable.

**FLOW OF MILK NOT ARRESTED IN THE EARLY PERIOD.**—If tuberculosis, like the acute diseases mentioned above, either entirely arrested or sensibly diminished the secretion of milk, of course the dairyman's attention would soon be drawn to the affected animal; but unfortunately this is not the rule in tuberculosis; the subject of the disease, although emaciated, and even in cases in which the udder is affected, continues to supply milk, and such milk is capable of communicating the disease to many animals certainly, and presumably to a man. When the carcass is examined there is commonly abundant evidence of the existence of tubercle in the lungs and other organs, but the flesh is rarely so affected as to attract notice. The public are thus exposed to two risks from bovine tuberculosis—the risk of being served with milk in which tubercle bacillus can often be detected, and the risk of being served with meat from an animal who suffered from tuberculosis long enough to begin to show signs of wasting. Naturally the risk from milk is the greater, if for no other reason than that milk is ordinarily ingested raw, and meat not till after being properly cooked.

**A GREAT DIFFICULTY CAUSED BY UNSANITARY CONDITIONS.**—As Dr. Littlejohn, in his report states, this disease differs so widely from other acute diseases, and in its first stages is so difficult to diagnose, that, were the proposal adopted, heavy expense would be incurred by the indiscriminate slaughter that would result. Moreover, as tuberculosis is largely dependent on insanitary conditions for its development and spread, allowing compensation for animals affected would not tend to improve the state of byres and cow-houses, which at present are rarely what they should be in structure, ventilation, drainage, etc.

**THE TWO QUESTIONS** connected with this disease which are of the greatest public importance are (1) the limitation of the food supply from the prevalence of tuberculosis among our herds and dairy stocks, and (2) the risk attending the sale of milk from tuberculous cows.

**AS REGARDS THE FIRST:** Dr. Littlejohn believes that tuberculosis is largely on the increase, and that in all cases, except those exhibiting the earliest appearance of the disease, the affected animal should be condemned.

There can be no doubt as to the risk run by the community owing to the sale of milk from a dairy containing a single affected animal. Dr. Littlejohn urges the importance of such an enlargement of the acts as to include tuberculosis, and meanwhile the peremptory enforcement of the provisions of the Dairies, Cowsheds and Milkshops Orders with a view to stamping out tuberculosis by means of improved sanitation.

STATISTICS, BACTERIOLOGY AND HYGIENE, OF  
DIPHTHERIA.

VINCENZO COZZOLINO, clinical director for laryngology in Naples, has published an important paper on the above subjects, the conclusions of which are summarized as follows, in *L'Osservatore*, and published in the *Pacific Record of Medicine and Surgery* :

a. STATISTICAL CONCLUSIONS.

1. It results from all recent statistical publications that mortality by diphtheria has been on the increase for the last 5 or 6 lustres. 2. Mortality by diphtheria exceeds that by all other febrile exanthemata (small-pox, scarlatine, measles). 3. The Italian reports from 1881-1883 show that during these three years there were 6,256 deaths from scarlatina, 15,811 from measles, 3,158 from small-pox, 19,588 from typhus, 21,095 from diphtheria. 4. In comparison with diphtheric mortality in Italy, amounting to 35 per cent, it was in England 14.75, in Scotland 21.53, in Ireland 19.12, in Germany 43.77, in Austria 57.72, in Switzerland 39.47, in Belgium 35, in Holland 9.88, in Spain 24.70.

b. CONCLUSIONS WITH REGARD TO SEASONS, AGE, SEX, ETC.

1. Diphtheria is prevalent in winter and in spring. 2. Mortality in the middle of months is greatest in diphtheria, then in typhus, measles, small-pox. 3. Immunity before the end of the first year is only a relative one, not absolute; children of from 1-5 years of age are most exposed to the disease. 4. There is no marked difference between the sexes with regard to frequency of the disease. 5. The rural population furnishes the principal contribution to mortality by diphtheria.

c. CONCLUSIONS RELATING TO THE CLINICAL BIOLOGY OF THE  
DIPHTHERITIC VIRUS.

1. The diphtheritic virus (micrococcus, alga or cryptogami) is not dependent on cosmoteluric agents for its vivification, but the influence of humidity as an incidental promoter for the development of diphtheria is an established fact, and conditions of seclusion, atmospheric changes and cohabitation excite its vitality, centuple the influence of the contagion and predisposes for the malignant forms. 2. With regard to receptivity of the virus, there are families who, in consequence of local conditions, chronic phlogoses or preponderant vascular irritation of the naso-pharyngeal membrane facilitate implantation of the diphtheritic virus. 3. With regard to immunity, the author thinks it consists in a special resistance of the mucuous membrane in consequence of a stronger vitality of its epithelium or its tissues, in the vascularization and activity of the lymphatic vessels, resulting in a rapid evacuation of the contagion, and also in a very low state of excitability of the vasomotorial nerves. 4. A further consideration of the clinical biology of the diphtheritic virus goes to show that, besides its diffusion through the air, there is also a diffusion

through water, beverages (including boiled ones), through inoculation and especially through the naso—pharyngeal membrane.

*d.* CONCLUSIONS RELATING TO PATHOGENETIC PARASITOLOGY GENERALLY, AND OF DIPHTHERIA ESPECIALLY.

1. The author accepts Pasteur's theory, that it is within man's power to prevent parasitic diseases and that generatio acquivaca is an absurdity. 2. It is to be expected that, in future, specific medicaments will be discovered against the various forms of parasites. 3. Diphtheria belongs to the great and still increasing tribe of diseases with bacteriological basis.

*e.* CONCLUSIONS WITH REGARD TO THE PROBABLE ORIGIN OF THE DIPHTHERITIC CONTAGION.

1. The diphtheritic virus of man is transmissible to animals and from animals to man, as for instance chicken-diphtheria. 2. The sale of diseased chickens is to be prohibited, and their interment to be confined to remote places. 3. Chickens ought not to be kept in the house, their dejections being liable to mingle with the rain-water and to taint drink-waters.

*f.* CONCLUSIONS CONCERNING PRIVATE AND PUBLIC HYGIENE.

1. The virus always penetrates through the lymphatic vessels, through inhalation or through absorption and inoculation into our organism. 2. It may be asserted with certainty that the mother is the first transmitting agent of diphtheria to her children or to those she comes into contact with. 3. Everything, belonging to a diphtheritic patient, not only his excrements, is to be watched and disinfected. The best hygienic conditions are to be provided for, in order to protect children from being attacked by the disease. 4. Isolation after convalescence ought to be continued for 15 to 20 days. 5. During a diphtheritic epidemic, it is not advisable to perform a bloody operation in the throat (tonsillotomy), to neglect treatment of humid eczemata and serpiginous affections, and to prescribe application of vesicatories and cauteries. 6. In cases of death after diphtheria, the body ought to be washed with a strong solution of chloride of zinc (5.10%) or with some other antiseptic solution. Besides as long as general cremation has not been established, separate burial places ought to be erected for all cases of death from infectious diseases.

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THE Russian Medical Department has just issued a set of rules for the sanitary supervision of the rag trade. All dirty rags must be transported in strong bags, previously treated with a disinfecting solution. The establishment of stores and shops dealing in rags in densely populated localities is strictly prohibited. Picking and sorting rags and all treatment of them generally can be performed only after a most careful antecedent disinfection of the material. All workers engaged in manipulating rags in any way must wear special clothing.

## LINDSAY SANITARY CONVENTION AND SESSION OF THE ASSOCIATION OF HEALTH OFFICERS.

THIS meeting was held August 16, 1888, and proved to be a success. The Opera Hall was well filled at most of the sessions with physicians and citizens. After opening prayer, the Mayor gave an address of welcome on behalf of the Corporation and Judge Dean on behalf of the citizens of the town. Dr. Coventry, ex-President of the Association, responded in the name of the Association. The president called upon Dr. C. H. Hewitt, of Minnesota, President of the American Public Health Association and Secretary of the State Board. Dr. Hewitt expressed great pleasure at being present at a Canadian Health Association, and trusted to assimilate and carry home new ideas regarding methods with the view of still further aiding the progress of work in his own State and country.

The regular programme was then proceeded with. Dr. Coventry presented a paper on a "Brief Retrospect of the Progress of Medicine, Curative and Preventive, from 1828 to 1888." Dr. H. P. Yeomans, member Provincial Board of Health, presented a paper on the "Sanitary Supervision of Schools." Dr. Burrows introduced the discussion on the paper and remarking concerning the unsanitary condition of many of our public schools, stated that in his opinion it was time that a medical inspector of schools be appointed. Dr. Hewitt, Minnesota, stated that some difficulty regarding the sanitary supervision of schools existed in his state. Theoretically our medical and sanitary views may be correct, but when we are asked to adapt them to the school system, it is going 100 far. The machine must not be disturbed. But the radical wrong in the machine must in all seriousness be removed first; and here the first, middle, and last difficulty is met. After all, however, schools exist only for one end, *sana mens in corpore sano*; and if they do not fulfil this end, schools are in whole, or in part failures. Mr. H. Knight, Public School Inspector said. It is, hardly fair to expect trustees to throw out desks supposedly good four or five years ago for others just discovered good. Ventilation and heating are much greater difficulties in connection with this question. Till trustees see that the health of the pupils is more to be considered than the expenditure of a few dollars, results will be imperfect. There is a real difficulty in obtaining a good water supply for the schools. Dr. J. B. Lundy, Medical Health Officer, Preston, said. The jacketed stove has in some cases served a purpose, but in the withdrawal of pure air he had found difficulties. Dr. Hewitt, referring again to this matter, explained how he has managed many of the practical difficulties. Especially is it desirable to have floors oiled inasmuch as it prevents the accumulation of dust. He further referred to the danger and difficulties arising in connection with the isolation of infectious diseases. Dr. J. Coventry, Windsor, said that the difficulty in most cases lies primarily in connection with the teacher. If the teacher does not have a high domestic ideal of hygiene they will not

have it at school. In few cases, indeed, had he and even one thermometer, in a school-room. But a teacher must be supported. Dr. Hewitt, Minnesota, delivered an eloquent address on

“ PRACTICAL SUGGESTIONS ON INTERNATIONAL AND INTERSTATE  
CO-OPERATION FOR THE PREVENTION OF DISEASE AND  
FOR STAMPING OUT EPIDEMICS.”

He spoke of the necessity of speaking in a popular manner in order that the people and their officers of health should be brought in close, intimate, and friendly relationship and co-operation. What does the subject mean? Not quarantine. That word has passed and co-operation has taken its place. What is the unit on which we have to act or take action? It is the family, whether clean or unclean, this is the unit! Our ideal is a clean and healthy family; *i.e.*, a clean person. This is not quarantine, as France shutting out Germany against cholera. There is a household disease. It is the cleansing there; we know that the infection of a disease, say small-pox may be cultivated, either artificially or externally, indefinitely. Let us discuss one of these diseases say small-pox—and we know how easily the municipal mind gets frightened at this. This we can handle, but it is those other diseases, diarrhoea infantum, diphtheria, etc., which are of most importance from their mortality. Forty per cent. of all deaths occur under five years from these causes. Again, take phthisis, which causes 11 per cent. of all deaths, and yet we sit down stolidly as if they were to be. See the difference. Think of the great cholera conference at Rome. There they sat and sat and discussed a disease prevailing there only partially and locally, and yet these other diseases pass unnoticed. Now we see the results of sanitary co-operation in regard to cholera and small-pox, in which co-operative and preventive measures have usually taken place. Now we would get the same results if we applied ourselves to co-operation in regard to these other diseases. The terms of Interstate and International co-operation, etc., are only convenient for classification, and do not alter in their nature from that of individual co-operation and isolation. The absence of co-operation was illustrated by an outbreak of diphtheria amongst Norwegians in Minnesota. Compulsory isolation and disinfection were avoidable, they were adopted and the disease was eradicated. The speaker thought that the public good demanded placarding and isolation, even though a hardship. Better for the municipality that the expenses of such a case be paid. Another good way is one being adopted in many places, especially in towns the size of Lindsay, *i.e.*, to have a small isolation hospital. Another way adopted frequently in Minnesota is to erect a tent and isolate in that. If the people do good work in the 700 municipalities in Ontario the example will become even more contagious than any of these diseases and may even spread across the line in spite of the protection tariff, and even help people there as you have helped yourselves.

Dr. J. J. Cassidy read a paper on “How to Prevent Consumption.” Dr. C. W. Covernton gave the opinion of Italian

physicians in favor of having isolated hospitals for consumptive diseases. Dr. Yeomans, Mt. Forrest, said that the zymotic origin of tuberculosis affects most practically the question of inheritance and curability of phthisis. Dr. McClellan, of Trenton, thinks it is a question, as yet undecided, as to the best practical methods of dealing with this infectious disease.

Dr. Griffin, of Brantford, gave a paper on "Notes on Inspection of Public Milk Supplies," Milk inspection he said is yet in a somewhat immature state. In his district he thinks there are three difficulties, viz., watering, skimming, and uncleanness, the latter, by far, probably the most important from the standpoint of health. He is quite certain from experience and enquiry, that the watering takes place in the rinsing of the pails with water just before milking. As regards skimming, he believes that it is in keeping back of the last parts of the milkings or the strippings for cream. The practical methods of dealing with the inspection in Brantford was then taken up. A permit is issued to vendors every half year by a printed form, which is signed by the vendor as an agreement. If they refuse inspection beyond the limits of the town, the permit is taken from them. The Inspector makes periodical visits, and gradual but great improvements have been made in the condition of the dairies. Dry earth is used in some instances. As regards sickness in cows, there is real difficulty. First, the ignorance of the milkman, another, gross carelessness or culpability in mixing the milk in Massachusetts a standard is supplied and all milk not coming up with it is seized and vendors prosecuted. Dr. Griffin thinks that milk not coming up to 1029, and a butter fat of less than three per cent. should be condemned. He would make standards, three per cent., three and a half per cent., and four per cent., and the lowest should be at least maintained. Regarding the tuberculous dangers in milk, Dr. Griffin has no doubt but that in his country tuberculous milk was even now being mixed with drinking milk. It was most necessary that every cow in a district should be examined by a veterinary surgeon at least once a year, and every tuberculous animal destroyed. Dr. McClellan, of Trenton indicated that the methods of inspection in vogue there with one or two convictions in the police court, had greatly improved the quality of milk. He further stated how inspection by the veterinary surgeon had tended to raise the standard of cows and of milk. Dr. Hutchison, Medical Health Officer of London, speaking, said, Quevenne's lacto-densimeter will detect skimming and watering, but it is imperfect in some respects. His office had 137 chemical analyses made last year, and these served to correct the imperfections of the instruments. Dr. Hewitt, of Minnesota, thought the publication of monthly analyses would be a most important practical method of raising the standard. Dr. Hutchinson stated this had been done in London last spring, and as a result some men doubled their sale while others lost nearly all their custom. Dr. Coventry, pointed out the difficulty in this connection, viz., that the poor will have still to buy the cheap milk: we must fix the standard so that the poor too will get good milk. Let it not be too high, but protect even the buyers of the worst.

The address of the president (Dr. Burrows, Health officer of the town) was of sensible brevity, and highly suggestive. Dr. Burrows has given much attention to the subject of education and favors much needed reforms therein. "We are educating too much in one sample and quality beyond the demands and the necessities of a new country. The evil is noticeable in the overcrowding of the professions and the robbing of the artizan's bench the farm and the factory, and that too, at a sacrifice of health and true physical development from the teacher's desk to the judge's chair." He did not regard with great favor the system of isolation and placarding in infectious diseases as at present insisted upon. "To make isolation perfect we should provide means for separation and removal of those first attacked. There should be homes or hospitals where a parent or nurse could take care of the sick entirely away from other members of the family, it should not be requisite to placard dwelling-houses during a long course of sickness, and prevent the wage-earners pursuing their occupation." He urged for an uniform system of health statistics, for inebriate asylums, and for the education of the public in health subjects by the free distribution of pamphlets.

Mr. W. Chipman, of Brantford, read a paper on "Sewage of small Towns," which was commended by several physicians.

Dr. Coventry presented the report of the deputation which had been appointed to wait upon the Ontario Government and ask for aid to establish a hygienic laboratory and that the Secretary of the Provincial Board might give his whole time to public work. The deputation was kindly received by the Attorney-General and Treasurer, who listened to the arguments. . . . The attorney-General promised to give the matter his consideration and spoke favorably of the idea [is this satirical or serious?—ED. H. J.] The growing appreciation of sanitary work, the advances in executive health work by Boards and Medical Health officers, make the necessity yet more manifest that the Government should specially undertake the task of lending them assistance in determining the exact causes lying at the origin of disease both of men and animals, experiments in the matters of construction and ventilation, the sources and conditions of pure water supplies, and the discussion of the best methods for our various cities, towns, and villages. This Association, of which there are so many Medical Health Officers willing to work in the interests of public health, would demand that the Government at least lend them such support in this direction as to give them a medical office to which they might refer in difficulty and also give them some one to devote his time to the work. This completed the work of the convention.

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At a recent meeting of the Hastings Town Council, Mr. Councillor Bray moved a resolution of wide public interest, the purport of which was the proposal to establish a system of voluntary registration of houses by the Town Council after examination and report by the borough surveyor or nuisance inspector.



## NOTES ON GENERAL SANITARY PROGRESS.

IN some institutions in England stoves have been introduced which bring in constant supplies of fresh air, warm it, circulate it, and carry out the vitiated air. Dr. Richards, in his own large library, has one which keeps the room all over at the temperature he requires. Sir Spencer Wells uses one for each bed-room. In one hospital some forty are used.

A FRENCH Colonel has ascertained that he can wash his men with tepid water for a centime, or one-tenth of a penny, per head, soap included. The man undresses, steps into a tray of tepid water, soaps himself, when a jet from a two-handed pump plays upon him tepid water, and he dries and dresses himself in five minutes : against twenty minutes in the usual bath, and with five gallons of water against some twenty in the bath. In Germany they have an arrangement, devised by Mr. Grove, under which half a million soldiers are now regularly washed. There is also an invention, applicable to schools in which it has been proved a child can be completely washed in three minutes.

IN Hamberg, Germany, there has been much progress in the laws relating to the hygiene of emigrant ships and lodging houses. This especially in relation to cases of infectious disease, closets, baths, etc., to the separation of the sexes, and to cubic space and ventilation.

IN a factory in Rothan (Alsace), which employs about 700 workmen, it has been the custom for ten years past to give a cup of coffee to every workman at the beginning of the day's work. The expenses, which are borne by the proprietors, amount to only one penny for four cups.

IN Glasgow, Scotland, there are 16,413 houses of one department, and 6,617 houses of two departments, which have metal tickets on the doors, stating the cubic contents of the dwelling and the number of inmates allowed. Inspections are made by the officers of the Sanitary Department betwixt the hours of 11 p.m. and 4 a.m. Householders found overcrowding are summoned to the police courts and fined or admonished. By this supervision a marked decrease has taken place in typhus fever.

IN the schools of St. Gall canton, a sensible step has been taken. At the beginning of winter every child brings to school a pair of slippers ; the wet boots worn on the way are taken off and the children keep on during the whole school time their warm and comfortable slippers. Meanwhile the boots have time to dry and can be worn without inconvenience on the way home.

IN Berne, Switzerland, prizes offered by the Agricultural Association have brought out 13 essays on the most rational nutrition of the rural population. To three of the essays prizes were given, and the authors are unanimous in asserting that " our forefathers lived better and cheaper than we do." Fewer potatoes and more beans, peas, oatmeal, milk, brown bread, pork and lard were used. ' The children were sent with a piece of brown bread into the stable, there to drink milk fresh from the cow.'"

At Munchen, Gladbach, a society has been founded for the purpose of creating cheap, healthy, and well-arranged dwellings for the working classes, and to facilitate their purchase. Up to the end of 1886 the society had built 291 houses and in the following year the number had increased to 315. The houses are built on the Cottage system, and adapted to the family life and habits of the Bavarian working people.

A NEW process for purifying sewage has just been made public, in a report of the Royal Engineers. Some proto-salt of iron, it appears, is used, with gentle agitation in perfect darkness. The Sanitary Record (Sept. 15 '88) says: The discovery of this new method of utilising the remarkable properties of iron has opened the door to a wholly novel treatment of sewage. Down to the present time the expressions 'chemical treatment' and 'precipitation' have been used as convertible terms; and 'sludge' is spoken of as a necessary product of sewage treatment. In Mr. Conder's (the new) process there is no precipitation of putrescent matter. The solids subside as a fine black powder, easily swept along by a gentle current, which dries easily on exposure to the air, is entirely inoffensive, and while drying into a fine sharp dust, is indistinguishable from garden mould.

A SOCIETY has lately been started in England for introducing there the "Sloid" system of education, a "manuel instruction." Somewhat like the Froebel system, it appeals to the active and constructive instincts, stimulates curiosity, arouses interest, calls into play the love of usefulness, enlists the will on the side of work instead of against it and gives pleasure. It calls all the muscles into play and offers great variety of movement, so that no one set of muscles is unduly strained. Both hands are used and thus both sides of the body are brought into play; a more harmonious growth is attained and the danger of growing up crooked is averted. No other kind of manuel work as a school subject has ever combined such training of the hand to general dexterity, with due exercise of the whole body.

A SCHOOL OF HYGIENE has been established in connection with the Institute of Experimental Hygiene in Rome. Instruction in matters relating to public health and sanitary engineering will be given to medical men, engineers, veterinary surgeons, and pharmacists.

THE DANGERS OF CITY MANURE are strongly alluded to in the Sanitary Record of August 15, and many instances are mentioned of outbreaks of disease in rural districts from desposits of the excrement. The Record says:—"Now that attention has been thus prominently drawn to the subject, it would be well for the responsible officers of all districts in the neighbourhood of large towns to make inquiry as to the disposal of city manure.

THE PROFITS OF SMOKE consumption, as compared with its distribution throughout a city, are illustrated by a report of a firm of dyers in Leeds, England, through improving the draughts, chiefly it appears by enlarging the flues they saved in fuel £1,000 stg. a year.

THE plumbers in England are strongly urging for a national system of registration of plumbers. A public meeting was recently held at Newcastle at which where a large number of masters and workmen from various towns in the North of England, and at which measures were taken toward the formation of a general system of registration.

FROM ANALYSES of numerous specimens of Canadian cheese, in a Bulletin issued in August last, the Chief Dominion Analyst, T. Macfarlane, F. R. S. C., reports that, the examinations shew that only pure butter-fat enters into the composition—that nothing approaching in character to “filled cheese” has so far been manufactured or even sold in Canada, and that no admixture of foreign fat whatever takes place in the manufacture, of Canadian cheese. In 1887, 62,878 lbs. of cheese were imported into Canada from the United States and entered for home consumption.

MEDICAL OFFICERS in England are strongly urging that compulsory notification of infectious disease be made a part of the law of the country. Now it is only provided that any town desiring to establish such registration may do so.

NATIONAL REGISTRATION of infectious disease is also being urged. This has for its object the circulation confidentially among health officers of weekly returns of infectious sickness reported in different localities. In time this might be made International.

YELLOW FEVER, says the New York Herald, is a crime. The same may be said of most other epidemics.

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#### MISCELLANEOUS SELECTIONS AND ITEMS.

SOME EXPERIENCE IN MEASLES INFECTION.—Dr. Reichard of Fairplay, Md., has closely studied three invasions of measles in that place and gives the following conclusions:—1. Measles are spread by actual contact with the *materies morbi*. 2. A case in the stage of incubation may inoculate those who are unprotected. 3. It cannot be carried (as usually meant) by a protected person coming from a case of the disease to a susceptible person. 4. It does not spread through the atmosphere. 5. Strict quarantine will prevent. Had the child, when she came from Washington City, been strictly quarantined, the epidemic might have been prevented. In each of the three invasions we have traced all trouble as beginning with a single person.

DURATION OF TUBERCULAR INFECTION.—The germ of glanders possesses but little vitality; complete drying kills it; putrefaction shortens its life; and the chances of infection diminish, and disappear as time proceeds. The germ of tuberculosis, on the contrary, realizes conditions highly favorable for more remote infection, for it survives the majority of microbes usually associated with it. Neither drying nor putrefying, it appears, destroys it, while both processes often allow of its being distributed through air or water. MM. CADEAC and MALET (Lyons Médical, quoted in Lancet) have sought to discover the time required to

destroy the germs of tuberculosis in dried, putrefied, or frozen matter. The experiments prove that tubercular matter dried and pulverized may preserve its virulence, since one hundred and two days after its preparation it was capable of transmitting tuberculosis. Schill and Fischer maintain that tubercular matter only loses its virulence after six months. Pietro asserts that well-dried sputa may remain infective for nine or ten months if maintained at a mean temperature of  $25^{\circ}$  C., but it appears probable to MM. Cadeac and Malet that the virulence does not persist after thirty or forty days, unless special care is taken to preserve it. The results show the desirability of completely destroying all the tubercular matter ejected from patients. MM. Cadeac and Malet found that virulence is maintained one hundred and fifty days in pieces of tubercular lung exposed during winter to the atmosphere. Pieces of tubercular lung were kept at a temperature from  $1^{\circ}$  to  $8^{\circ}$  below zero, and remained frozen for more than a week; yet virulence was maintained. When dried pieces have a considerable volume, the virulence lasts longer than when the matter exists as fine dust, owing probably to the more ready action of the oxygen of the atmosphere on the latter condition. As to the influence of putrefaction, one hundred and sixty-seven days appeared to be the limit of tubercular virulence in tubercle allowed to putrefy. Putrefaction exercises its destroying effects more rapidly when the putrescible mass is of but little volume.

CREMATORIES—CHICAGO *v.* MONTREAL.—The "American correspondent" of the London Sanitary Record, having stated that Chicago was the first city to adopt the system of cremating its household refuse, Mr. Henry R. Gray, the late energetic chairman of the Montreal Board of Health, writes as follows in the Record of August 15:—"Will you kindly correct the blunder your American correspondent has fallen into. . . . As a matter of fact, Chicago sent a committee to inspect our system and report, and our contractor got the contract to erect and start their crematories. As early as 1884, when I took my seat in the City Council, I began the agitation in favor of the complete obliteration of the city's filth by fire, and in August 1885, I succeeded in having the first crematory for the cremation of night-soil built. The people of Montreal, and more especially the inhabitants of the surrounding municipalities, were so delighted with the result, that I had very little difficulty in getting the contract passed for the erection of the larger crematories the following year.

HENRY R. GRAY.

Montreal, July, 1888.

THE PURIFICATION OF SEWAGE.—This question has lately been engaging the attention of the Belfast Town Council, and at their request Mr. Haddock of Owens College, Manchester, has performed some interesting experiments. (British Medical Journal July, 21, 1888.) In one of these a quart of a patent disinfecting and deodorising fluid was added to a trough containing 100 gallons of sewage matter, with the result that in a quarter of an hour all

odour was removed, and the sewage matter was found to be divided into a solid and perfectly inodorous sediment, and a supernatant fluid consisting of water in a state of tolerable purity. The experiments were watched by a Committee of the Town Council, among whom were Dr. Whittaker, Dr. Graham, and Dr. Stewart, and we understand that the members of the Committee were favourably impressed with the method.

**DANGERS OF CANNED FOODS.**—An exhaustive inquiry has recently been made into the characters of canned foods. (Pacific Record of Medicine and Surgery.) All the tins when opened were found to contain microbes, and it was demonstrated that the process followed both in Europe and America causes at most only the apparent death of micro-organisms, which only wait for favourable conditions to start anew into activity, and possibly virulent. Meat also seems to undergo some change resembling decomposition, the muscular fibres undergoing an alteration that resembles fatty degeneration. The same is true of fish, which seem least fitted for preservation in this manner. Meat apparently was more invested with micro-organic life than vegetables and pine-apples; asparagus and carrots, gave evidence of suffering least from microbic invasion.

**THE INFECTIOUS PERIODS.**—The duration of the infectious stages of various diseases is thus given by Dr. Pearse: Measles, from the second day of the disease for three weeks; small-pox, from the first day for four weeks; scarlet fever, from the fourth day for seven weeks; mumps, from the second day for three weeks; diphtheria, from the first day for three weeks. The incubation periods, or intervals occurring between exposure to infection and the first symptoms, are as follows: Whooping cough, fourteen days; mumps, eighteen days; measles, ten days; small-pox, twelve days; scarlet fever, three days; diphtheria, fourteen days.

**EDUCATION OF PLUMBERS IN FRANCE.**—A School of Sanitary Plumbing has lately been established by the Council of the Association of Working Plumbers in the Department of the Seine, for the purpose of giving these artisans better instruction in the practical part of their trade, and a competent knowledge of the principles of hygiene relating to their work.

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**IN THE EXECUTION** of murderers by electricity, as provided for in the Legislature of New York, it will be well to exercise great care that in attempts to save such criminals from just and merited punishment they do not prove to be the indirect cause of other deaths, and that the criminals themselves do not escape the death penalty. The New York Medical Journal points out that in apparent death even by lightning stroke the victim has recovered; and refers to a recent quotation in the *Lancet* of a letter from Franklin to a friend in 1773, in which he gave an account of his own experience in killing a turkey by electric shock, and in which he very nearly killed himself. Dr. Richardson, (before the R.S.P.C.A.) in 1869, demonstrated that the process was full of difficulties. Sheep stricken down by the shock, required a charge of ninety-six feet of surface, and with every precaution the workmen were exposed to great danger, while the expense was proportionately great.

## EDITORIAL SPECIALS.

DURING THE QUARTER ending the 30th of September there were, besides a number of annual meetings of sanitary bodies, two very important Conferences of Physicians, at both of which sanitary questions received a good deal of attention, and to reports of which we have given in this number a good deal of space. There is probably no subject bearing upon the public health of greater moment than that relating to the Communicability of diseases from domestic animals to mankind, while tubercular diseases are, of all, the most destructive to life. Of little if any less consequence is the subject of the disposal of excrement and other waste matters of towns and cities. At the International Conference on tubercular diseases in man and animals held in Paris in July, some important questions were in a measure settled; while at the large annual meeting of the British Medical Association in Glasgow in August, the subject of sewage farming received much attention and this method of sewage disposal was strongly advocated, and in preference to all other methods.

AS TO "CONSUMPTION," to mankind the most fatal of all diseases, it seems to be now settled that in animals, especially in milch cows and fowls, it is identical with that in the human race; and that it is common in bovines, and may be readily, and not infrequently is, communicated from these animals to the human body. While the temperature of boiling water, or probably a less degree of heat, destroys the infection, the interior of a piece of cooked flesh is often dangerous from not having been sufficiently heated. It was therefore unanimously advised by the Paris Congress that Boards of health be empowered, in all countries, to investigate cases of disease in animals; that all tubercular animals be destroyed; that special watchfulness be exercised in the cases of dairies "to prevent the contamination of the milk by that from a diseased cow"; and that every effort be made to warn and educate the masses of the people in order to prevent the frequency and spread of the disease. The resolutions we give in full on another page.

IMMEDIATE ACTION was taken by the French Government upon the advice of the Congress. Relative to this the British Medical Journal (of Sept. 27) says: In a courageous willingness promptly to accept the logical consequences of scientific discoveries, the French have frequently set an example which can only excite our admiration. Public opinion in this country and in our colonies moves more slowly, and the respect for vested interests leads to the perpetuation of practices which are injurious, not only to the public health, but, in the long run, to those interests which it is intended to conserve. After referring to the resolutions, the one to the effect that steps be taken to spread information relative to preventive measures among the public, the Journal continues: Without seeking to detract from the value of the other work "It yet appears that by far the most important work achieved by the Congress was the adoption of these resolutions.

AN EXHAUSTIVE PAPER on this same subject was read by Mr. Thomas Walley, Principal and Professor of Veterinary Medicine and Surgery in the Royal Veterinary College of Edinburgh, at the annual meeting in July of the Sanitary Association of Scotland, a full report of which we have just received. In our next issue we purpose giving extracts from this valuable and practical contribution to the present knowledge on this subject. Prof. Walley showed

a large number of specimens of organs of different animals in which were tubercular deposits. He made important statements in reference to the probability of the disease being transmitted by means of eggs, and of experiences confirmatory of the views of Baumgarten, who has succeeded, it is stated, in discovering the bacilli of tubercle in the ova of certain animals. In his concluding remarks Prof. Walley said :—“ In the vast majority of instances the system of inspection and condemnation of meat, and of milk too, for that matter, is a bad one, inasmuch as it is largely entrusted to individuals who have had no special training to fit them for the office they have to perform, and who have no knowledge of the nature of disease or of its effects upon animals or through them upon man.”

**EDUCATE**—Educate the masses in health subjects. In this appears to be the best prospect for real progress in public hygiene. As some one has already said : The individual may toil and strive, but he is largely still at the mercy of his neighbor, whose erratic proceedings may upset all foresight and personal attention to sanitary and physiological laws. The *Lancet* says : Most people will wish for greater powers of sanitary control over the actions of their neighbors. There is doubtless much in this, but it is universally conceded that by the dissemination of a knowledge of hygiene among the masses we can accomplish most permanent good.

IN AN EDITORIAL on the progress of sanitation, in the *Brit. Med. Journal* of September 15th ult, we read the following impressive lines on this subject of education :—Public opinion has for the most part ranged itself on the side of the sanitarian ; but still it is too true that it is characteristic of the common state of the popular information that, while a single death from violence or passion excites general attention, deaths day after day from preventable causes pass without any notice whatever. Filth, whether in the individual or in communities, has long since been shown to be one of the most fruitful sources of disease and death, with all their attendant misery and waste of human energy, and consequently an increased appreciation on the part of the general public of the truth of the aphorism that “ cleanliness is next to godliness ” is one of the first wishes of the sanitary reformer. But for the fulfillment of this wish we must look to the spread of education and the dissemination of information. Hence every opportunity of demonstrating the benefits of proper sanitation should be utilised.

THE NATIONAL MUSEUM of Hygiene in Washington comprises an interesting collection of sanitary appliances with many suggestive specimens of defective drain-pipes, traps, plumbing etc. ; but as Dr. Billings said at the Congress of Physicians and Surgeons last month : “ It is not well housed, it is much overcrowded, and its location is so inconvenient that it receives but few visitors, and, therefore, it has by no means the educational influence that it ought to have.” And further, “ It should be provided with ample quarters in the immediate vicinity of the National and of the Army Medical Museums.” A few months ago we had the pleasure of visiting this museum, which is now at 1707 New York Avenue, and of spending several hours examining the valuable collection therein ; through the most kindly courtesy of—, and in company with Major Charles Smart U.S.A., and Dr. Wells, of the Navy Department, who was then in charge, temporarily only we believe.

THE COLLECTION comprised many varieties of closets, traps and other plumbing exhibits ; ventilating and exhaust cowls, wood carpet and parquette

flooring ; veneerings of wood and enamelled bricks, faced in various colors, for walls ; school desks and seats, life preservers, crematory models, models of army hospitals, etc , etc. There are drain pipes with the bore almost completely closed with hardened deposits, and specimens of others (from South America) bored through by ants ; corroded and perforated soil pipes, with many specimens of such pipes and waste pipes with the bore completely closed by solder at the joints from careless plumbing ; fruit cans with the interior badly corroded ; and a great variety of other things of like character. And not the least interesting object was a model of a Parsee " Tower of Silence," where these strange people dispose of their dead.

THE YELLOW FEVER in the south will prove, it is hoped, another stimulus which will induce towns and cities to constantly keep their house in order ; while the " shot gun " quarantines will probably " bring home," or ought to, to the apathetic and indifferent in health matters, the value of the ounce of prevention and the great desirability of " Keeping it in stock." The Memphis calamity was losing its effect in the minds of those who have in hand the care of cities. Northern cities may take the lesson to heart. If the yellow fever is not likely to visit the cooler climes of the north, other fearful scourges are acclimatized to these regions and are no respecter of persons. Up to September 26th there had been a total of 2,314 cases at Jacksonville, with 221 deaths (a low rate of mortality), and a proportionate number of cases at Manatu, Tampa, Fernandina, McClanney and other places.

A MINISTER OF HEALTH is aptly pressed for by the Southern Practitioner for this month (Oct.) in the following language : " 'The farmers have at last secured a representative in the Cabinet. From March 4, 1889, the Secretary of Agriculture will be a member of the Cabinet and will be in a position to see that the agricultural interests of the country are given proper consideration and are protected.—Nash. Am.' The farmers and those interested in Agriculture may well be congratulated but something more is wanted ; yes urgently, imperatively needed. The cry goes up in most emphatic tones of the urgent need of a DEPARTMENT OF HEALTH, with a Secretary, also a Cabinet officer. Time and again has Congress been appealed to in this regard by leading Sanitarians and Scientists throughout the country, and there is a strong possibility that if an earnest, urgent appeal is now made to our representatives, aided by the sad and terrible emphasis arising from the present epidemic, creating so much consternation, absurd mismanagement, annoyance, trouble and disaster in the entire South, which can but more or less affect the entire country, a proper recognition of the Public Health interests may be attained. There is just as much need for a Department of Health, as for the Department of War, Justice or the Navy." The Practitioner, with other Journals and, especially, this one, has long urged for a MINISTER of Health.

THE ONE MAN POWER is, after all, far superior to the old irresponsible " Board ". Let there be advisory boards, but let us have the ONE responsible HEAD. As an illustration, the town of Pullman, Ill., shows just what this power with scientific sanitation, intelligence and honesty can accomplish. With a population of 12,000, the drainage and cleanliness of the town are so complete, the facilities for healthy amusement and instruction so abundant, with an entire absence of liquor establishment, that in 1887 the death-rate was per 1,000, in 1886 only 8, and this year proportionately still less, against 26 per 1,000 in New-York City. As the New-York Medical Times says, " The secret of this wonderful showing is that Pullman is under the control of a one-man power, the Pullmans, who are autocratic in the management of the affairs of the city." This is just what we need everywhere.



**PUBLISHER'S SPECIALS.**

Once more we appeal to those in arrears to remit the amount due, as per account, sent in July and on former occasions. We are providing one of the most practical and useful health journals in the world, but we cannot continue to do so without some remuneration.

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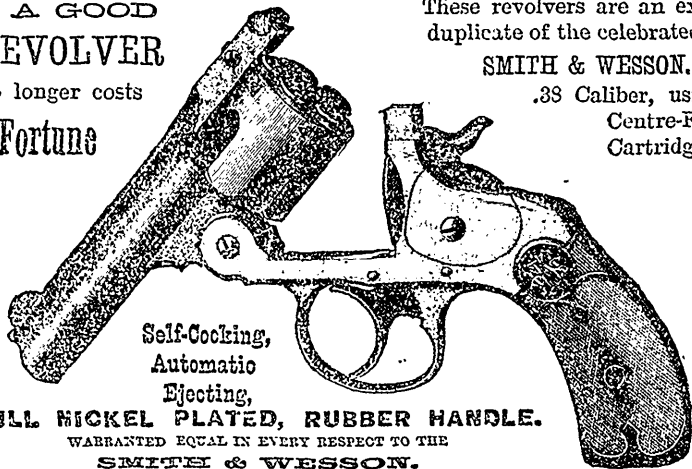
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