

notify the same to the chief or landlord's tenant by printed circular, and shall register the house in a book with cubical measurement, etc.

In many provincial towns and some London districts where the bye-laws are in force, a rent limit is fixed, and any lodging-house or lodger's room, the rent of which is above the fixed limit, is exempt. In most of the London districts, however, houses are only exempt until such time as the landlord is called upon to supply the information for registration.

#### MISCELLANEOUS.

Closets to have proper doors with requisite fastenings, also flushing apparatus, and the soil-pipe to be of impervious material, with air-tight joints and adequately ventilated.

Limewashing to be done between April and August inclusive.

Papered walls to be stripped after an infectious case has occurred, and whenever otherwise necessary.

Yards and areas to be paved, and walls of yards, areas and wash-houses to be limewashed once a year.

Notice of the occurrence of an infectious case to be given by the lodger in whose apartment it occurs to the keeper of the house, and by him to each of the other lodgers, and by both to the medical officer of health. (Kensington.)

The keeping of animals so as to render the room or premises filthy, forbidden to the landlord as well as the lodger. (Wandsworth.)

Reduction of lodgers for a limited period compelled in any lodging-house upon notice from the Town Council stating the reason for and the period of the required reduction. (Birmingham, Leeds.)

WASHING OF BED CLOTHES.—Every blanket, rug, and other bed clothing, to be thoroughly washed four times a year. (Evidently referring to a low class house.) (Leeds.)

No room in basement below ground level to be occupied as a sleeping room. (Leeds, Manchester.)

No room used as a kitchen or scullery to be occupied as a sleeping room. (Manchester.)

It is perhaps unnecessary to demonstrate how very much the adoption of bye-laws must strengthen one's hands in dealing with lodging-houses in comparison to any attempt that might be made under the ordinary powers of the Public Health Acts. In fact, for the registration, systematic inspection and improvement of these semi-public houses additional powers as by bye-laws are absolutely necessary. It would be absurd under our general powers to attempt to obtain desired results. As soon as we began to work systematically we should be denied entrance, and, being admitted, we should have no power to demand the required information, nor of prescribing any rules for general observance, whereas by placing the bye-

laws in the hands of the landlord, we should make him responsible once for all for the requirements which affect him, and thus ensure the saving of labour in the interminable service of notices under the Public Health Acts.

### EPIDEMIC OF TYPHOID FEVER DUE TO THE INGESTION OF IMPURE ICE.\*

BY

Dr. DORANGE, Physician Major (1st Class) at Rennes.

SINCE Rennes has had a supply of water drawn from important springs to the west of Fougères, in the valley of the Minette, at the point where they emerge from the granite, *i.e.*, since 1884, typhoid fever, previously endemo-epidemic and very fatal in the town, has become rare, and as an epidemic has disappeared.

The following figures relating to the decennium preceding and that immediately following the distribution of water of good quality were compiled in preparing for the Army Medical Statistics the return of cases of typhoid fever occurring among the personnel of the Army and treated in the Military Hospital:—

|   | Typhoid Fever. |         |
|---|----------------|---------|
|   | Cases.         | Deaths. |
| Period anterior to supply of spring water (1874-83 inclusive) ... ..    | 1466           | 211     |
| Period subsequent to the spring water supply (1885-94 inclusive) ... .. | 233            | 10      |

The year of transition, 1884, has been purposely omitted.

The Seventh Regiment of Artillery suffered from a slight epidemic of *Dothienenteritis* in the month of August, 1895, when the camp of Coetquidan (Morbihan) was broken up. A week before the close of the musketry schools, nine cases of typhoid fever occurred in a few days. The patients were at once removed to the Military Hospital at Rennes and all recovered.

Investigation demonstrated a hydro-fecal origin of the infection. Certain dealers on the outskirts of the camp patronised by the men afterwards attacked had been in the habit of drawing their water from an obviously contaminated source, at a point where, on the occasion of our subsequent inspection, we observed on the surface of the spring several papers stained with fecal matter.

A sample of this water was forwarded to the laboratory at Val de Grâce, and the analysis confirmed our observation in the following results: "1872 aerobic germs per cubic centimetre. This number is much below the reality, the liquefaction of the gelatine on the fourth day having interrupted the enumeration. Among the isolated colonies, along with common species, were found putrefactive germs and the bacterium coli."

"Signed VAILLARD."

\* Translated from the Revue d'Hygiène for April, 1898.

The outbreak ceased immediately after the troops left the camp.

The four last months of the year left nothing to be desired, and it was during a time of excellent sanitary condition that the circumstances presently to be related suddenly occurred.

In the other regiments of the garrison, the 41st of the Line and the 10th of the Artillery, typhoid infection was alike absent. A case of *Dothienenteritis* in an officer of the 10th Regiment of the Artillery should be mentioned. In the town there were only a few isolated attacks. The poorer quarters, where wells have been retained, were as usual those principally affected. In the course of December eight cases of the disease were treated in the town hospital, not a very large number considering the population of 70,000. One (perhaps a secondary) cause of typhoid infection, which it would be wrong to omit, is the want of traps to the house-drains, which, being left open, tend to contaminate the air of the dwellings.

Be that as it may, eight lieutenants of the Seventh Regiment were, all at once, attacked with typhoid fever in December, 1895. The suddenness of the appearance of this malady in a particular group of officers, of whom three were married and five were single, at once led to the suspicion of some special cause.

The two first cases observed were of a mild type. These officers were attacked between the 12th and 14th of December, and were able to go on convalescent leave at the end of the month. The sickness of the lieutenant last attacked dates from the 25th of December, and the invasion in this case began with paroxysms of fever, which were repeated six or seven days in succession, and were characterised by the three stages of intermittent fever. He recovered after a relapse and a prolonged convalescence. Between the 14th and 24th December, the other five lieutenants fell sick. In one the malady took the ataxo-adynamic form, with sub-delirium and spasm of nearly all the muscles, rendering the administration of nourishment difficult. Then, after twenty-four hours' intermission, the pulse became feeble and the patient succumbed on the fifteenth day to myocarditis. In another the prognosis was serious from the onset, this young officer having albuminous nephritis of many years' standing. The urine contained not less than from 8 to 10 grammes per litre of albumin. The patient died on the twelfth day. The remaining three officers recovered, but the convalescence of one of them was very long.

As regards the cause of the outbreak, authorities on the question of the duration of the period of incubation of typhoid fever state that this varies from eight to twenty-one days.

Where, then, was the place of meeting of these officers (who did not habitually live in common), at which they were likely to have caught infection?

We at once thought of the banquet of the 4th of December, St. Barbara's Day, which had brought together all the officers of the regiment at the same restaurant.

On this hypothesis, the introduction of the typhoid germs having taken place on the same day in all, the incubation would be from eight to ten days in those first attacked and twenty-one in the later ones. The theory was, therefore, *a priori*, admissible. The menu of the dinner was the same for all; but in the room for superior officers and captains the water used was that of the town, the establishment having no other available. The lieutenants, on the contrary, drank champagne-cup made with iced water from bottles.

This latter group of officers having been attacked whilst the others escaped led us to suspect the ice, and our investigations were directed to it. We soon learned that all the ice sold at Rennes, whether for consumption or refrigeration, came from the river Vilaine, and was collected a little below the town and below the confluence of the Ille and the Vilaine, after these rivers of stagnant waters have received all the sewage of a large district, and the foulings of a gas manufactory and several wash-houses.

The ice merchant, on being asked, did not deny the fact, but wished, on the contrary, to show that all the impurities of the water were removed by congelation. According to his view, freezing, like fire, purified everything. We, on the contrary, know that ice contains as many germs of all kinds as the water from which it has been made. It follows, therefore, that the ice sold at Rennes, in blocks or fragments, is manifestly contaminated, and we felt it to be our duty to direct the attention of the Council of Hygiene to this fact, and the Council passed a resolution in conformity with our conclusions at its meeting in January.

But as we have stated above, it was not ice in pieces, but iced water in bottles, which the lieutenants used, and, according to the purveyor, the bottles contained Minette water only. Unfortunately for this purveyor a police regulation prohibits all non-subscribing tradesmen, of whom he is one, from drawing from the town fountains. These are at a distance from his establishment, and we have ascertained that there is on his premises, directly in front of the store of ice from the Vilaine, a reservoir into which all the water melted from this ice flows. As the water bottles were cooled in this reservoir, is it not reasonable to think that the tradesman, who saw no harm in selling impure ice, might not use the water melted from it to fill the bottles that were to be iced? Having this water ready to hand, and already cold, the operation would be all the more easy. Lastly, he does not possess a double set of vessels, one to take to the fountain for the water, and the other wherewith to empty the reservoir, so that all are contaminated. If it be added that, in addition to the eight officers

attacked, a certain number of others at the same table had gastric disturbance ten days after the banquet, and that those who did not take champagne, but drank beer instead, felt no derangement, it must be admitted that the cause suspected is more than probable.

We have not, it is true, an analysis of the incriminated ice, as it was impossible to obtain one in time, owing to unforeseen circumstances.

This is not the first time that impure ice has been indicated as the origin of an outbreak of enteric fever. In 1875, James Carder, on being required to examine the ice at Rye-Black (State of New York), in consequence of a serious epidemic attributed to ice contamination, interdicted the use of the water of Lake Omondaga for ice for alimentary purposes. A similar result occurred in Connecticut.

M. Prudden, of New York, has ascertained that pathogenic microbes live perfectly in ice, and that they are more numerous in ice containing air bubbles. The bacillus of enteric fever is particularly resistant in ice. After one hundred and three days' freezing of an incalculable number, 7,000 of these remained. In a second experiment, there remained 73,300 after seventy-seven days, and 7,348 after one hundred and ninety-two days. At Evesham, in 1882, an epidemic of typhoid fever was declared to be due to the ingestion of ice prepared from the water of an infected well.

Frankel, who has studied the ice of Berlin, has demonstrated that it contains microbes in considerable numbers. In 1882 Chantemesse and Vidal froze water containing typhoid bacilli without affecting the vitality of these organisms. Finally in 1893, in a report made to the Council of the Seine, M. Alfred Riche, reporter to a Commission under the presidency of M. Leon Colin, confirmed all the foregoing facts. He made it evident throughout that when ice has been the established cause of epidemics, these have been due, not to ice as a cold body, but to impurities of the natural substance.

Such are the facts observed. What, then, are the practical deductions from them? The conclusions of the excellent report of M. Riche deserve attention. No matter what feeling of partisanship for individual liberty one may have, it appears to us absolutely necessary to put a stop to a condition of matters so prejudicial to public health. The use of ice as an alimentary or therapeutic agent is of great importance, and that substance, like meat, mushrooms, etc., should be subject to careful inspection.

Every merchant or manufacturer of ice should be compelled to pay a water-rate proportionate to, if not above, his probable consumption.

Ice for cooling purposes, so as not to be confounded with that for consumption, should be kept in a special place, and should be priced differently,

or sold and conveyed in vehicles, inscribed "Ice, not for consumption."

Reservoirs on the tradesmen's premises must be done away with, too, so as to offer no temptation to servants, who do not understand the danger, to have recourse to them, or even to dip into them utensils meant for water of good quality.

Ice sold for consumption in restaurants, cafés, hospitals, etc., should always be made artificially from the water of the town.

There is ground for prohibiting the sale for consumption of ice so impure as that from the Villaine or its affluents.

The decree of the Prefect of the Seine, of May, 1893, prohibiting the sale of ice from the pond of La Briche at the north of Paris is a precedent in this respect which should be followed in all great towns.

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#### A CONTRIBUTION TO THE ETIOLOGY OF TUBERCULOSIS WITH SPECIAL REFERENCE TO PROPHYLAXIS AND THERAPEUTICS.\*

By Dr. K. F. ANDVORD.

THE author calls attention to some points in connection with the appearance and development of tubercular disease which have hitherto received but little attention. Throughout the paper the facts are drawn chiefly from Norwegian statistics of mortality from tubercular disease, but it is probable that the conclusions he arrives at would be equally true of other countries.

He first emphasises the striking agreement in the number of deaths due to tubercular disease, and especially from phthisis, every year in different districts. The oscillations of the mortality curve from tuberculosis are always small, although it may vary somewhat in degree in different towns, and may also, when taken over a long series of years, gradually fall or rise to a lower or higher average. Thus in Christiania from 1865-96 it has varied from 38-25 per 10,000, or an average of about 30 per 10,000 yearly. At the different age periods, also, practically the same number of deaths from tubercular diseases takes place from year to year. There is a primary maximum during the first two years of life, a primary minimum at the age period 10-15 years, followed by a secondary maximum towards the close of life. This regular appearance and behaviour of tubercular disease is particularly noticeable when compared with that of the acute infectious diseases, or even with such diseases as cancer, heart affections, or bronchitis. The curve of tubercular disease always varies least, and the author is therefore driven to the conclusion that this regularity in its behaviour must be due to some more deep-seated cause than that to which it

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\* *Norsk Magazin for Laegevidenskaben*, No. 4, 1898.