Steam at 22 lbs. pressure is thus let in for a period varying from five minutes to a quarter of an hour, according to the nature and quantity of the articles. Another vacuum is then produced immediately after the end of the steaming process (average 18 minutes), and air at a temperature of about 220° F., is admitted into the vacuum for from five minutes to a quarter of an hour, after which the operation is completed and the several articles are removed from the apparatus perfectly dry. Thus no further drying operations are necessary. No attempt is made to warm the articles before the application of steam, as it is considered that this would interfere with the efficiency of the steam in disinfection. The air which is introduced for the final process of drying, is heated to 220° F. by being passed through a steam chamber (the steam pressure being the same as that in the jacket), which chamber is just outside but attached to the jacket.

The object of the steam jacket is not to produce superheated steam inside the chamber, but is to compensate for the condensation of the steam against the exterior surface, against the doors and also against the clothes, and thus to prevent the steam from changing its nature, that is, degenerating from pure saturated steam into a vapour mechanically mixed with aqueous globules.

The following tests were made by Dr. Parsons, and are described in his report to the Local Government Board, 1884.

Test for Penetration.—A bale of white rags weighing 186 lbs., loosely packed, was placed in the machine, and steam at 15 lbs. pressure (251° F.) was admitted into both jacket and exterior, at the end of an hour a thermometer in the centre of the bale registered 242° F.

A full-sized bale of press-packed cotton rags, measuring 3 ft. 6 in. × 3 ft. × 2 ft. 3 in., and weighing 5 cwt., was placed in the machine and exposed for four hours to steam at 15 lbs. pressure, relaxed every half hour, the pressure in the jacket being 30 lbs. At the end of four hours a thermometer in the bale registered 258° F.

Two pillows, each 2 ft. long, 1 ft. wide, and 6 inches thick were taken. One contained the ordinary quantity of feathers (about 3½ lbs.), the other a double quantity (about 6½ lbs.). A thermometer was placed in the centre of each and they were placed in the apparatus for half an hour, steam being applied at 15 lbs. pressure in both chamber and jacket, and at once relaxed. At the end of half an hour the thermometer in the fullest pillow registered 212° F., and in the other pillow 239° F.

The foregoing experiments were made with the older type of machine and before the introduction of the vacuum apparatus.

A LIMITED OUTBREAK OF ENTERIC FEVER IN LEEDS.

BY

GODFREY CARTER, M.R.C.P.

THE usual autumnal increase in the number of cases of enteric fever has been very marked in most localities this year, as we should expect at the close of a hot, dry summer. I am speaking altogether apart from the unusually heavy incidence of the disease upon such places as Maidstone, King's Lynn, and Belfast, where somewhat special conditions have prevailed.

As regards Leeds, the total number of cases notified during the nine weeks ending October 2nd was 157, or at the rate for the nine weeks of 2·14 per thousand of the population per annum. Although this was not alarming for the time of the year, yet it was observed by Dr. Spottiswoode Cameron, the Medical Officer of Health, that an undue proportion of the cases existed in one particular Ward. It seemed advisable, therefore, to institute a somewhat detailed examination into this matter, and determine what special causes, if any, were at work in bringing about the condition, and in the investigation he invited my assistance.

The number of cases notified in this portion of the City during the period mentioned was 32. The incidence upon the population of the Ward was at the rate of 6·02 per 1000 per annum. The majority of the cases were situated in the vicinity of three streets, running, roughly speaking, east and west, along a shallow valley falling towards the east. The northern of the three streets which lies lowest, takes a southerly bend just before leaving the ward, and the other streets drain into its sewer. Just north of these streets is an east-west fault, the down-throw on its southern side. South of this fault the subsoil is clay and shale, extending in a southerly direction up-hill to an old churchyard on a sandstone island, covering the shale to its south. The north side of the fault is also sandstone (Elland edge). Under these three streets naturally the soil is wet and heavy. From inquiry at the patients' houses, it appeared that very few of them had been away from home within a month prior to being taken ill.

Multiple infection.—Three houses had duplicate cases. In two of these, the second persons attacked had slept with the first and rendered personal nursing attention, the incubation period of these and of two other cases, where the people had come fresh to the neighbourhood, appeared to be about 14 days.

Age and Sex.—The incidence of disease was fairly equal upon the sexes, with a slight excess upon males. (Males, 17. Females, 15).

No patient was under 5 years of age.

Six averaged from 5 to 10 years (or 18·7 per cent.).

Seven from 10 to 15 years (or 21·8 per cent.).

The remainder were between 15 and 45 years of age.

Ice Creams.—Twenty-eight per cent. of those affected had purchased ice creams from street vendors, but taking into consideration the fact that the inhabitants of this neighbourhood did so very generally during the hot weather, no great significance was attached to the circumstance.

Shell Fish, Oysters, etc.—Two of the patients had eaten oysters.

Mortality.—It was too soon to speak of the rate, but two deaths had already occurred.

Dwellings, etc.—This part of the city is chiefly inhabited by the better working class, and the majority of the houses seemed comfortable and amid favourable surroundings.

Drainage.—W.C.'s were situated outside 13 of the houses or 40·6 per cent. Trough closets—only one was in use. Privy middens—these were used by 19 houses or 59·4 per cent., and the number of households using one midden was from one to four. It may however be stated that as a routine practice, immediately upon the notification of a case being received, the midden was emptied, disinfected freely used, and a special bucket provided, having an air-tight lid, for the future use of the patient. The drains were at the same time tested, and, if faulty, put right.

Drain Testing.—The drains of each affected house were tested by placing the contents of a calcium phosphide capsule down the nearest available inlet. The smell of the test was perceived inside the dwelling in 25 per cent.; 14 per cent. of them with water closets, and 32 per cent. where there were middens.

Milk Supply.—Suspicion fell upon the milk distributed by two brothers, because 41·6 per cent. of the cases in the Ward were amongst families purchasing from them. One brother obtained his from a farm outside the city, and the other from his own cows. No case of illness had recently occurred at this farm. There was a large stone trough in the yard, the water from which was generally used for farm purposes. A sample examined contained chlorine, ammonia, and nitrates in excess of what is commonly found in the neighbourhood. In appearance the water was clear, odourless, and free from sediment. The results of analysis were as follows:—

Reaction, Alkaline.

Total Solids, 16·0 grains per gallon.

Chlorine (expressed as NaCl), 2·3 grains per gallon.

Nitrites, Nil.

Nitrates (expressed as HNO₃) 0·22 per gallon.

Free Ammonia, 0·036 parts per million.

Albuminoid Ammonia, 0·094 parts per million.

Oxygen consumed by moist combustion process, 5·6 parts per million.

The stone trough was fed by a tap, leading from a main which specially supplied this and another farm. The water was conducted in a lead pipe about 300 yards from a place in a pasture field,

where, on rather higher ground, was a tank about four or five feet below the level of the grass field in which it was placed. This tank was loosely bricked at the sides, and covered in by a slab of stone. There was much deposit, and on being agitated, mud, fragments of straw, and vegetable matter were brought to view. Occasionally, we were told, the lead supply pipe, leading away towards the farms, became choked. It was then usual for a man to get down into the chamber and use a force pump to remove the obstruction. The overflow from this tank, and a similar one nearer the house, went in ordinary land drains to a pond in the farmyard.

The spring from whence this water was chiefly derived was said to come towards the surface, about two-thirds down the slope of a cultivated field, at the top of which was situated a farm house. From its source in this field the water ran to the tank through common land drains, of course open at every joint. Part of the intervening land was now growing turnips, and had been manured in the spring. Judging by the small amount of total solids contained, it seemed probable that we had not to deal with water from a deep spring. The chlorine, compared with other natural waters of the neighbourhood, indicated recent animal contamination, and the ease with which the albuminoid ammonia distilled over supported this view. Both probably arose from the manure which had been used for agricultural purposes.

Professor Trevelyan made a bacteriological examination of this water, and also of four samples of milk; three of them obtained from the premises of the two brothers, one of whom purchased from this farm, but lived and retailed milk in the infected area. The examination of the water gave no help; so also with three of the four samples of the milk. But one of them contained in the centrifugalised sediment, a bacillus, morphologically resembling Eberth's. A subculture in alkaline broth gave no distinct Widal's reaction; but a growth on potato gelatine, rubbed up in water, showed mobile bacilli resembling Eberth's, which lost their activity and fell into "clumps" when treated with the serum of a patient recovering from typhoid. This sample of milk came originally from the farm, but had been put aside by request on the Saturday evening, and the milkman had kept it in his cellar. The other specimen from him was procured on the Monday morning, and had never entered the house. The cellar had a sink communicating through a trap with the city sewers. Calcium phosphide placed beyond the trap, caused a smell within the house. To follow up the matter, when the drain under the cellar was examined, it was found composed of clay jointed stoneware pipes, leaking at nearly every joint. It was admitted that milk was, under ordinary circumstances occasionally kept in this cellar, which was exposed to the ingress of sewer gas. There had been several early cases of fever in the immediate vicinity of this dairy, and conse-

quently, in all probability, drain contamination. Though the milk obtained from only one of the two brothers showed the bacillus, it was found that when either of them ran short, he obliged his brother. Fortunately, only a small portion of the milk entered this cellar. And though the empty cans were kept there, any contamination of them would scarcely affect seriously the milk in course of distribution. The other causes of heavy incidence were probably to be found in defective sanitary conditions, and the prevalence of offensive privy middens.

VACCINATION AND SMALL-POX.

Mr. Picton and the Royal Commission.—Certain comments made by *The Times* on Lord Herschell's speech touching the Jenner Memorial drew from Mr. Picton, one of the signatories of the "Dissent" to the Final Report of the Royal Commission on Vaccination, a letter from which we take the following :—

"I do not know whether, in your reference to Lord Herschell's speech on the Jenner Memorial, you quote him as stating that there were on the Vaccination Commission "members actively opposed to vaccination." If so, it is necessary to explain that there were, indeed, opponents of compulsory vaccination, and these were at least two more than the signatories of the "statement of objections" to the Final Report. But in the sense of theoretic opponents to vaccination as a preventive of small-pox the facts are entirely different. As one of the two who signed the statement of dissent, I declare that I entered on the inquiry with a belief in Jenner's alleged discovery. It was the evidence laid before the Commission, and that alone, which after seven years' study of it convinced me that, as a preventive of small-pox, vaccination is absolutely futile."

Mr. Picton's recollection of his mental attitude towards the question in, and before 1889, has been very satisfactorily refreshed by two letters which immediately succeeded his. From the letter by "M.D." we extract the following crushing retort :—

When Mr. J. Allanson Picton states, as he does in his letter to you, that as one of the two who signed the statement of dissent from the Report of the Royal Commission on Vaccination he "entered on the inquiry with a belief in Jenner's alleged discovery," he must surely be oblivious of the article he contributed to the *Contemporary Review* in 1889, in which he declared that he "was rapidly approaching" the conclusion "that vaccination is of no use." And it is somewhat curious that, after the seven years' study of the subject and of the evidence submitted to the Commission during that period, he stated his conviction, not that vaccination, as a preventive of small-pox, is "absolutely futile," which is the conclusion at which he seems now to have arrived, but that there are other "more effective and practicable (as well as less objectionable) modes" of dealing with the disease. It is difficult to see how a remedy can be at the same time effective and practicable, even though in a limited degree, and also absolutely futile. There must be

many of your readers who are familiar with the minutes of the evidence laid before the Commission, and with the able way in which Mr. Allanson Picton cross-examined the witnesses for vaccination, who must feel that if he was at this time a believer in Jenner's "alleged discovery" he was wonderfully successful in dissembling his belief. If Mr. Picton was not placed on the Commission because of his supposed sympathy with the views of so many of his political supporters it is not easy to understand why he should have been put on it at all.

Dr. McVail was perhaps even more successful in summarising Mr. Picton's true opinion of the value of vaccination *before* his seven years' study of the question. The following is the former's letter of November 5th last.

Will you allow me to contrast Mr. Picton's declaration of yesterday with a declaration made by him in 1889?

Referring to the inquiry by the Royal Commission, of which Mr. Picton was a member, he says: "I declare that I entered on the inquiry with a belief in Jenner's alleged discovery."—(*The Times*, November 4th, 1897.) In moving for the appointment of a Royal Commission in the House of Commons on April 5th, 1889, Mr. Picton is reported thus: "In fact, he believed vaccination to be just as ineffective as baptism."—(*The Times Parliamentary Reports* for April 5th, 1889.)

Further, in the *Contemporary Review* for January, 1889, referring to the view "that vaccination is of no use" Mr. Picton wrote: "I am rapidly approaching that conclusion myself." Thus, in January, 1889, Mr. Picton was rapidly approaching the conclusion that vaccination is of no use; by April he had definitely arrived at that conclusion; in May he was appointed a member of the Royal Commission on Vaccination; and now he declares he entered on the inquiry with a belief in vaccination.

Sanitation the Scientific Antidote to Small-Pox.—Under this heading a letter to the Editor of *The Local Government Journal* appeared in the issue of November 20th last from Mr. Williamson, of London. From the tone of the letter it is easy to see the opinion of the writer as to the value of vaccination, and the opening and closing paragraphs of the communication have, therefore, a peculiar interest as demonstrating the incapacity of certain individuals to grasp simple truths when set before them. The letter has a further interest in showing the slight effect the labours of the Royal Commission have had in convincing those who are opposed to vaccination root and branch of the error of their way. The portions of the letter which are not given here consist of quotations from the Second Report of the Commission containing evidence from the Sanitary Reports of the Indian Government, which, it may be remembered, published certain individual opinions as to the absence of any co-relation between increase of vaccination and diminution of small-pox, and suggesting that sanitation was more likely to check the disease. The Reports were issued in the late '70's.

A resolution alleged to be signed by 850 medical officers of health, reported in *The Local Government Journal* of October 30th, has made the tour of the Press, which declares that sanitation is useless without vaccination as a preventive of small-pox. As there is nothing to show that the