the population have the benefit of the water-carriage system of sewage disposal. One end of this system, namely, the water supply, is excellent, being taken from a gathering ground in the mountains near the town and at a good height above it, and being efficiently filtered in accordance with modern principles. When we come to the middle of the system—the most important part in many respects—we are not treading on such safe ground, as many of the waterclosets are defective in various ways and most inefficiently ventilated.

There are a large number of cesspools in the town, and I believe that many of the town sewers are, owing to faulty construction, little better than cesspools. The crude sewage is run straight into the river, in the middle of the town, without any attempt at purification. Fortunately, the forces of Nature have provided us with a fine river, whose current is rapid, and for the most part of the year runs with a large volume of water, otherwise we might suffer more than we do from inefficient drainage.

There are two other things which I must allude to as no doubt in some measure contributory to the excessive phthisis mortality in Clonmel. The first is the condition of the slaughterhouses. Several of these are at the back of the butchers' shops, close to dwelling houses, and are not kept in a proper sanitary condition. It is also a very common custom in the town to keep pigs in close proximity to dwelling-houses.

The second matter I refer to is the horse and cattle fair, which is held every month in the main streets of the town. When numbers of cattle are herded together for hours all over the principal streets and up against the shop fronts, and when, as so frequently happens, the fair day is wet, it is hardly necessary to describe the filthy condition of the thoroughfares, which, in fact, are rendered almost impassable for decently-clad pedestrians. It is possible that some of these thousands of cattle may have tuberculous disease of their intestines, in which case, if we assume as proved the identity of human and bovine tuberculosis, their excreta would tend to spread the disease. I do not wish to lay too much stress on this probable cause of phthisis prevalence, but it is at least worth considering.

There is very little, if any, supervision of the cows which supply milk to the inhabitants of Clonmel and of their surroundings. I indeed fear that many of the milk vendors are quite indifferent to, if not ignorant of, the necessity for scrupulous cleanliness in all the details connected with the supply of milk to the public. Recent epidemics of enteric fever have been traced to the milk supplies, the probable source of origin being infected water used to wash milk cans. In particular I may instance the condemnation, by Professor O'Sullivan, F.T.C.D., of the milk supplied by one of the contractors to the county asylum, in the recent investigation into the origin of an epidemic of enteric fever in that institution. If enteric fever is spread in this way it is more than likely that many cases of tuberculous disease may have a similar origin.

There is another possible factor in the etiology of phthisis which prevails in Clonmel, as well as in all parts of Ireland. I refer to the dampness of the climate caused by the high rainfall. The average annual rainfall of Clonmel for the last twelve years was 41.45 in., and in 1902 it was as much as 50.8 in. and 53.91 in. in 1903. Although I think there can be little doubt that the damp climate of Ireland has some connexion with the excessive prevalence of phthisis, yet it is important not to exaggerate this connexion.

As I mentioned before, in 1864 the death-rate from tuberculous diseases was 3.3 in England, 3.6 in Scotland, and only 2.4 in Ireland. The decrease in the death-rate in the two former countries during the last 50 years, coincidentally with its increase in Ireland, is to be attributed rather to better sanitary administration than to any change of climate.

Again, in spite of the very high rainfall in 1903 the phthisis death-rate in that year was lower than it has been for some years. All over the kingdom the general death-rate for 1903 was below the average, a fact attributed by some authorities to the excessive rainfall preventing the dissemination of the germs of disease by dust to the same extent as in drier years. The rainfall in Carrick-on-Suir for 1903 was 63.5 in., and yet the phthisis death-rate in that town was much lower than in Clonmel.

The town of Clonmel is situated in a valley on the river Suir, which overflows its banks several times every winter, so that many houses near the river have their basements constantly flooded. There is a mountain range close to the town to the south with high rising ground to the north, so that the town is

situated in a sort of cup. The prevailing wind is south-west, and the climate is generally considered very relaxing.

REMEDIES.

I will conclude with a brief consideration of some possible remedies for the conditions I have described.

As it is impossible to alter the laws of Nature and of meteorology, one potent cause of high phthisis mortality will always exist in the large rainfall of Ireland. But that is no reason why those which are remediable should not be remedied.

Obviously the first thing to do is to see that the towns are administered, as far as sanitary matters are concerned, in accordance with the first principles of hygiene.

A proper system of disposal of excreta and refuse should be adopted, and whenever it is impossible to adopt the water-carriage system the yards of all houses should be properly paved and the privy-middens and ashpits constructed in accordance with the model by-laws of the Local Government Board, which should be enforced by all sanitary authorities. The provisions of these by-laws should also be enforced with regard to slaughter-houses and the keeping of pigs in proximity to dwelling-houses. I notice that the Corporation of Clonmel is just introducing a certain number of automatically-flushed public closets which is undoubtedly a step in the right direction.

There should also be a more efficient control of the premises and cows of milk purveyors. The cattle fair should be relegated to a proper fair green at a suitable distance from the town.

Under the Irish Poor-law system the dispensary medical officer is *ipso facto* also medical officer of health. The average dispensary doctor has neither sufficient time nor independence to deal adequately with important problems of public health, which are accordingly either allowed to go to the wall or dealt with by the sanitary inspector, an individual who, though in many instances an excellent official according to his lights, yet is not qualified either by education or by position to form a thoroughly independent judgement in all questions of sanitary reform.

Of course the medical inspectors of the Local Government Board do a great deal in the way of investigating epidemics and making recommendations for the good of the public health; but they have not time to attend to many necessary details. I think that if it were possible to appoint independent and properly qualified medical men as medical officers of health for each county they would bring the sanitary administration of Ireland more into line with that prevailing in England, and would give the smaller Irish towns a chance of being led into the ways of sanitary righteousness.

I have no doubt that the attention which is now being given to the open-air treatment of phthisis, and the steps that are being taken in different parts of the country to erect open-air sanatoria for the treatment of consumptives, as well as the efforts being made to educate the public as to the infectiousness of phthisis and the proper methods for its prevention, will in time greatly diminish the mortality from that dread disease.

PRIMARY INTESTINAL TUBERCULOSIS IN CHILDREN: PERFORATION OF ULCERS.

By NATHAN RAW, M.D., M.R.C.P. LOND.,

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PRIMARY tuberculosis of the intestine is, in my experience, a very rare condition to meet with in the *post-mortem* room. I have personally conducted over 600 necropsies on persons dying from tuberculosis, and have only seen 3 cases which I could unhesitatingly say were primary intestinal ulceration, the remaining cases of tuberculous ulceration being always secondary to lung infection. These 3 cases occurred in children aged 2½ years, 1½ year, and 2 years respectively. With regard to the significance of primary intestinal ulceration as a factor in the spread of the disease, Professor Koch, in his famous lecture in London in 1901, said:

If the bacilli of bovine tuberculosis were able to infect human beings, many cases of tuberculosis caused by the consumption of aliments containing tubercle bacilli could not but occur among the inhabitants of great cities, especially the children, and most medical men believe that this is actually the case.

In reality, however, it is not so. That a case of tuberculosis has been

caused by alimenta can be assumed with certainty only when the intestine suffers first—that is, when a so-called primary tuberculosis of the intestine is found. But such cases are extremely rare. Among many cases of tuberculosis examined after death I myself remember having seen primary tuberculosis of the intestine only twice. At the Charité Hospital in Berlin ten cases of primary tuberculosis of the intestine occurred in five years. Among 3,104 necropsies of tuberculous children Biedert observed only 16 cases of primary tuberculosis of the intestine. Hitherto nobody could decide with certainty in such a case whether the tuberculosis of the intestine was of human or of animal origin. Now we can diagnose them. All that is necessary is to cultivate in pure culture the tubercle bacilli found in tuberculous material, and to ascertain if they belong to bovine tuberculosis by inoculating cattle with them.

The question whether human and bovine tuberculosis are the same or different diseases has exercised the minds of scientific and clinical workers since 1901, when Koch made his famous declaration. Two Commissions were appointed to investigate this question. The work of the Imperial German Commission¹ was purely experimental, portions of tuberculous material being used from different parts of the body with special reference to the organs of children affected by tuberculosis. The report is unanimously in favour of Koch's contention that the bacilli from human and bovine sources have distinct morphological and bacteriological characters, which are sufficient for their easy differentiation.

This is of the highest importance, and confirms the observations made by me in the BRITISH MEDICAL JOURNAL of February, 1903. In addition, the German Commission has clearly proved that bovine tuberculosis is conveyed to children, and also particularly emphasizes the fact that tuberculosis is often primary through the intestines and mesenteric glands. From three cases of miliary tuberculosis in children they found the disease to have been introduced through the intestines, and in one case the infection was bovine from milk.

If we add to this the 7 cases of primary tuberculosis of the intestines or the mesenteric glands with those recognized as *Perlsucht* infection, we have 10 certain cases of primary infection of the digestive organs, of which 3 have to be considered as infection of *Perlsucht* or bovine tuberculosis by means of milk.

The result, then, of the work of the German Imperial Commission is to establish (1) that there is a distinct difference between the bacilli of human and bovine origin, and (2) that bovine tuberculosis is conveyed to children by means of infected milk, although they add not to any great extent. My own clinical and experimental work is in entire agreement with these results, excepting with regard to the amount of bovine tuberculosis conveyed to humans, which I consider is considerable. I believe that man is attacked by two distinct varieties of tubercle, one conveyed by infection from one person to another, the other by receiving into the body bovine bacilli from infected milk.

It is important to bear in mind that although primary intestinal tuberculosis is extremely rare, yet primary infection of the mesenteric glands is comparatively common; in children the tubercle bacilli pass readily through the walls of the small intestine and are conveyed by the lymphatics first to the nearest glands and then by direct extension throughout the abdomen, and in many cases through the diaphragm to the pleurae, lungs, and bronchial glands. This process of extension to the lungs I have met with in many cases, and numerous feeding experiments on animals have confirmed it.

During the last seven years I have had under my care 306 children suffering from what I have diagnosed as "*tabes mesenterica*," meaning by this tuberculosis of the mesenteric glands. A large proportion of these children recovered under careful treatment, whilst of the total number I had an opportunity of making a necropsy on 48. There can be no doubt that the abdominal glands and organs may be infected from the thorax downwards as well as from the intestine. In several cases it was obvious that the primary infection was through the lungs, and that the child by swallowing the sputum had infected the abdominal organs. On the other hand, the majority of my cases showed primary infection of the digestive tract with secondary lymphatic extension to the chest, and in some cases to the meninges. My cases of acute miliary tuberculosis all appeared to be of intestinal origin and bovine in origin.

The following are very brief notes of three cases of primary intestinal tuberculosis:

CASE I.

A child aged $2\frac{1}{2}$ was admitted to Mill Road Infirmary on June 13th, 1903, with the usual symptoms of intestinal tuberculosis. There was great emaciation, with enormous distension of the abdomen, with diarrhoea and offensive stools. The history of the child's feeding was carefully taken. It was fed on the breast till 14 months old, then on

cow's milk, which was usually bought at a milk shop or in the street. Enlarged mesenteric glands could be palpated through the thin abdominal wall, but the lungs showed no trace of disease. The usual treatment was adopted, careful feeding, and various nutrients, but he died on September 10th, 1903, having made little effort to improve.

At the necropsy there was great emaciation. The intestines showed extensive ulceration of the ileum and caecum with enormous enlargement of the mesenteric glands. Some of the lymphatic glands on the anterior surface of the vertebrae were much enlarged, but the viscera were not affected and the lungs appeared to be quite healthy. There were two recent perforations of the intestine near the caecum with local peritonitis.

CASE II.

A girl, aged 2, was admitted on June 29th, 1903, with all the symptoms of abdominal tuberculosis, constant diarrhoea, distension of the abdomen, and enlarged glands which could be easily palpated. The milk history was carefully taken. Child fed on the breast for ten months, then cow's milk which was never boiled. In spite of all treatment she died on August 22nd.

The necropsy revealed a condition almost exactly the same as Case I. There were fifteen to twenty typical tuberculous ulcers in the ileum with perforation of three of them and matting of the bowels. The mesenteric and abdominal glands were caseating and enlarged, whilst the lungs were quite healthy.

CASE III.

A child, aged $1\frac{1}{2}$, was admitted on March 13th, 1904, with cough, diarrhoea, and in a general hectic condition. She had a curious spasmodic crowing cough resembling whooping-cough and she was isolated on that account. She died in ten days.

At the necropsy extensive ulceration of the intestines, with old cheesy mesenteric glands, and a general lymphatic extension to all the abdominal viscera, then through the diaphragm to the pleurae, which were studded with grey tubercles, apparently quite recent. The bronchial glands were enlarged and compressing the trachea.

In conclusion, whilst I admit that primary intestinal tuberculosis is extremely rare in children, yet in my experience tuberculosis is very frequently conveyed to the digestive tract by infected milk, the bacilli readily passing through the intestinal wall into the nearest lymphatic glands, leaving no visible trace on the intestine.

This tuberculosis is not true human tuberculosis, but is bovine in origin, and may rapidly spread to all the viscera in the body, or may remain (as it most often does) localized in the mesenteric glands. Hence it is that, whilst tuberculous milk will not produce human tuberculosis, it nevertheless sets up bovine tuberculosis in the human body, more especially in children, and is even more virulent to children than the human variety. It is thus of the highest importance that tuberculosis amongst dairy cattle, especially those affected in the udder, should be recognized early and the cattle removed at once, and also that milk should be sterilized for all children under the age of 10 years.

REFERENCE.

¹ BRITISH MEDICAL JOURNAL, April 9th, 1904, p. 847.

SUPRARENALIN IN PULMONARY HAEMORRHAGE.

By DUNCAN MACDONALD, M.B., C.M.,
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IN view of the recent notices in the BRITISH MEDICAL JOURNAL I think the following case will prove interesting to your readers:

A.D., male, single, aged 28 years, had an acute attack of phthisis pulmonalis four years ago. There were distinct physical signs of the disease in the right apex and infracavicular region, with a temperature ranging from 99° F. morning to 103° F. evening. With open-air treatment and guaiacol carbonate he improved considerably, and was able to resume his work as a post-office clerk after about three months' treatment, being then transferred from a large city to a small seaside town post office.

The following year he had a sharp attack of pleurisy of the right side, for which he was tapped, and was able to resume work within three weeks from the date of the attack. With the exception of this slight interruption and his annual holiday he never lost a day's work from the time of his illness four years ago until January 16th, 1904. On that day on his way home from the office he called to see me, as he had observed a little blood in his sputum that morning. I then learned that about New Year's time, when the post office was exceptionally busy, he had done a good deal of extra work and heavy lifting for some weeks, had overheated himself, and had sweated and felt shivery in the intervals. His cough also became much worse; indeed, his cough had never left him in the morning since his first illness. I found well marked physical signs of cavity in the right infracavicular region, but he had no rise of temperature. I ordered him to bed and gave him a mixture containing iron, digitalis, sulphuric acid, and ergot. He progressed favourably till January 25th, when I allowed him to rise a little daily, but not to go out. On January 28th there was fresh bleeding, and the sputum contained more or less blood daily after that. I changed