NOTES ON SOME CONTINENTAL ABATTOIRS.

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DURING a recent investigation into the methods of municipal hygiene in Paris and various capitals of northern Europe, nothing struck me so much as the attention that was paid in them to the question of meat inspection. It is usual in this country to decry Continental sanitation, and to say that we have nothing to learn from it; but a very slight acquaintance with the sanitary administration of such towns as Brussels and Berlin would soon dispel this delusion. And with regard more particularly to the matter of meat inspection, it would be within the truth to say that in this country we are at least twenty years behind France, Belgium, and Germany. The only capital that I have visited where the condition of things is much the same as here is Stockholm. But even there the meat control is in the hands of two fully-qualified veterinary surgeons, under whom are twelve inspectors and ten microscopists, the last-named examining pigs' flesh for *trichinae*. Private slaughter houses still exist, but a scheme is now under consideration by the Town Council of Stockholm for the erection of an abattoir. In Christiania, since the beginning of this year, all meat that is sold in the town must undergo an examination at the hands of a specially-trained veterinary surgeon, and for this purpose an admirable meat control station has been built in a central position in the town, although as yet there is no abattoir.

It would seem that the horribly unsanitary condition of the private slaughter-houses in towns all over this country is not yet sufficiently well known to the general public, and the first step towards introducing a system of meat inspection is to abolish them and establish in their place public abattoirs. No one can without disgust inspect such dens as we have, where often the light can with difficulty penetrate, where, hemmed in by dwelling houses, through ventilation is well-nigh impossible, the floor often altogether unpaved, or so badly paved as to allow the ground to become sodden with blood and ordure, the walls of wood saturated with filth, the lairs insufficient for the accommodation of the animals, the soil riddled by rats, and the air infested with flies. All this, to say nothing of the unpleasantness to occupants of the surrounding houses of the sounds heard and smells carried from the slaughter-houses, makes them perhaps the greatest of all nuisances in a large city.

PARIS.

At Paris the three abattoirs I visited were those of Villejuif, Grenelle, and La Villette. In the first only horses are killed. It is, like the others, under the control of a veterinary surgeon, who inspects every animal before and after slaughter. La Villette, however, is the main abattoir of the city. Situated near the fortifications, it covers,

together with the cattle market, an area of about twenty acres. The cattle market consists of three enormous sheds, roofed in with glass above, but open at the sides all round. The centre building is for oxen; on the one side of this are stalls for the sheep, on the other those for pigs. The floor of the stalls is of cement, or of granite blocks set in cement. The supply of water is everywhere abundant. Arrangements exist in the shape of two hand-carts containing barrels of dilute cresylic acid for disinfecting on the spot any place in the market where an animal may be discovered infected with any dangerous infectious disease. The animal is at once removed to a place of isolation and disinfection carried out.

A staff of eight veterinary surgeons inspects all the animals as they stand in their stalls, carrying them off, if necessary, to the auscultation room for further examination. Those animals that are destined for slaughter are removed to commodious stalls, where they are housed until they are killed on the following morning. These stalls are kept beautifully clean. As soon as the animals leave the litter is removed, and a jet of water is made to play on the floor, which has a good slope to the central drain; it is then brushed and finally washed down with cresylic acid. One man is specially deputed to cleanse the mangers, which, by reason of the animals licking them, are a likely source of contagion. They are rendered in smooth cement, which facilitates their disinfection. The carts that bring the animals are not allowed, if dirty, to go away until they have undergone a disinfection with the same acid. The movable wooden partitions which form the stalls for the sheep are submitted, after each market day, to the action of a steam "pulvérisateur" containing cresylic acid.

The several buildings of the abattoir consist, as a rule, of a central court roofed in by glass and of two wings. It is in the central portion that most of the slaughtering is done. In one wing the animals are kept prior to their slaughter, in the other the carcasses are dressed and hung up for sale. The floor of the court is cemented, and has a sharp fall to the central drain, along which, as one of the regulations renders necessary, water is constantly running so long as the slaughtering is going on. Receptacles are at hand to receive the offal, trays to catch the blood, and tables on which to dress the carcasses. All the organs must be retained until the carcass has been inspected by the veterinary surgeon. The stables are large, well ventilated, and paved with granite set in cement. Attached to the abattoir are the *triperie*, the gut-scraping rooms, and the place for extracting the albumen from the blood.

At the Halles Centrales at the head of the scientific staff is the first authority on meat inspection in France, M. Villain, under whom are the various veterinary surgeons. In one corner of the building is the small "*salle des viandes saisies*,"

where the suspected meat is taken, and can be submitted to examination better than can be done when it is suspended amongst other pieces of meat on the hooks in the market.

The inspector who sees only the dressed animal must have much experience before he can satisfactorily discharge his duties. By placing meat in an inconspicuous position the butcher may seek to evade the vigilance of inspection; or, in the case of cachectic animals, he may deck them out in borrowed plumes, as, for instance, is done sometimes by wrapping round a cachectic sheep the omentum of some other that is not so affected. Or again, the farmer may send the one half of a diseased animal on one day and the other on another, or sell one half to one butcher and the other to a second, in the hope that a part, if not the whole, may escape seizure. Indeed, it is proverbial that the unscrupulous dealer in the country is under the impression that there is nothing too bad in the shape of meat for the Paris market, and hence the inspector must be up to all the tricks of the trade.

The seizure of meat is considered justified and is made* (1) When deprived of all edible qualities; (2) when the eating of it might be followed by injurious consequences; (3) when from some reason or other it has derived qualities rendering its taste repugnant.

Under the first head comes the flesh of animals that have been killed too young, and of those that are either dropsical or cachectic; under the second that of animals affected with disease, such as fever, septicæmia, anthrax, tuberculosis, etc.

As to the signs which guide the inspector in condemning the flesh of cachectic animals are chiefly the wasted condition, the absence of fat about the omentum, and the lack of resistance in the muscular tissue. With regard to animals that have died of inflammatory diseases the signs are:† (1) A general tarnished colouration, more or less deep red; (2) a capillary injection of the fat, which in extreme cases is penetrated deeply by it; (3) arborescent markings on, and a tendency to a livid colouration of the serous membranes; (4) a violet tint of the kidneys; (5) a brown or blackish colouration of the spongy bone, seen best in the vertebræ; (6) loss of firmness in the muscular tissue. But in addition are the evidences that can be gathered from the manner in which the animal has been prepared. Often where it dies there are not the proper means at hand for dressing the carcass, which consequently has to be done roughly. Meat in this condition frequently comes to the Halles Centrales, and is just the kind that would be overlooked by an unskilled observer.

On his rounds the inspector examines, besides the fresh meat, the sausages and hams also. An ivory pin is thrust about an inch deep into the

latter, and their condition judged of by the odour left on the pin.

BRUSSELS.

At Brussels there are two abattoirs, one belonging to the municipal authorities, the other run by a private company at Cureghem, on the outskirts of the town. The former is modelled after the abattoir at La Villette, although it cannot be said to be so good in its arrangements, and certainly the new one at Cureghem strikes one as being much the more cleanly and better ventilated. Here the cattle market consists of a large shed open at the sides, with an asphalted floor. Behind it are the twelve stables for the cattle, floored with tiles set in cement, sloping on either side to the drain. The mangers are rendered in smooth cement. The slaughter-houses are handsome brick buildings, with walls cemented to a height of five feet. Adjoining the inspector-in-chief's office is an excellently arranged laboratory, fitted up with microscopes, microtomes, and bacteriological apparatus.

Both of these abattoirs are under the control of veterinary surgeons, but at Cureghem the sub-inspectors have taken no degree in veterinary science, but have undergone a special training in meat inspection. Before condemning a carcass they must refer the question to the fully qualified inspector-in-chief. I may quote here what I wrote last year in an article entitled "Sanitation in Brussels":—

"The most important inspection of meat is made immediately after the slaughter, and on the condition of the internal organs he finds then the veterinary surgeon passes the meat or not. The meat is, however, subjected to three skilled examinations before consumption. First comes that of the living animal in the market, secondly that of the same when slaughtered, and, thirdly, when exposed for sale in the Halles Centrales, or shops. A stamp is affixed to every sound animal. Condemned meat is treated with sulphuric or carbolic acid to prevent its sale fraudulently. The Government pays an indemnity to the owner of the animal slaughtered, if he can show that this has been done in the interest of the public health and at the order of one of their recognised experts.

"The conditions under which the flesh of tuberculous animals is seized, no matter how good its general condition, are:—

"I. (a) Tubercle having its seat in both the thorax and abdomen. (b) Tubercle, whether it be thoracic or abdominal, with presence of tubercles in any other part of the body outside these cavities. (c) Tubercle generalised in the following organs: Lungs, pleuræ, peritoneum, liver, or mesenteric glands. (d) Tubercle of the lungs or pericardium involving the pleura extensively. (e) Tubercle of any organ of the abdomen involving the peritoneum extensively.

* "Manuel de l'Inspecteur des Viandes." (Villain et Bascou.) p. 289. † Op. cit. p. 188.

* *Medical Magazine*, August, 1893.

"II. Tubercle observed in no matter what part of the body, or what the number of the tubercles, when the animal is markedly wasted."

ANTWERP.

There is no need to describe the general arrangement of the abattoir here, as it is on just the same lines as those of Brussels. More slaughtering, however, takes place in Antwerp by reason of the number of carcasses that are exported to England. The fat melting, gut scraping, and triperie were on the premises, and an idea of their condition may be gained from the fact that, at the time of my visit, although the temperature was 90° Fahr. in the shade, very little unpleasant smell was detected. Adjoining the building was the steam apparatus, in which the carcasses of condemned animals were destroyed by being kept at a temperature of 150° C. for eight hours, a large refrigerator room, and the home for lost dogs, with a lethal chamber, in which, were they not reclaimed in five days, they were destroyed.

As at Cureghem, the inspector-in-chief alone is a fully qualified veterinary surgeon, his five or six assistants having received a special training qualifying them for the work of meat inspection. A part of the abattoir is devoted to the slaughter of horses, the flesh of which is not a little eaten in Belgium. I was informed that a good many carcasses were shipped from England to this end.

BERLIN.

The abattoir and cattle market form quite one of the wonders of this city, in which the sanitary administration is admirable in so many respects. The two together cover an area of 29 acres. The extent of ground alone covered by the three great halls for the oxen, sheep, and pigs, respectively, exceeds 11 acres. They differ from those in Paris and Brussels by being closed in at the sides by brick or glass. The general structure of the three long rows of buildings used for slaughtering the oxen is as follows: A central hall or passage about 30 ft. wide, ventilated by louvred openings situated near the roof, has the slaughter-houses opening out from it on either side. The central hall is open from end to end, the floor is tiled, the walls cemented to a height of 7 ft., and the whole divided up by iron bars into a number of compartments. Each compartment corresponds to a slaughter-house, and receives the carcasses when they are prepared and ready to be hung up as meat. Between these buildings, separated by a cemented court, are the stables for keeping the animals. In some of the sheds, especially in those intended for housing the pigs, the ventilation seemed to me insufficient. On the other hand, the two large halls for slaughtering the pigs could hardly be improved on. The least satisfactory feature at the Berlin abattoir when I visited it was the condition of the *triperie* and gut-scraping rooms, in some of which the smell was atrocious. Gut-scraping is well-recognised to be a

great stench provoker, but how completely this can be avoided by care and cleanliness is best seen in the similar rooms at the Munich abattoir, where the tables on which the process is carried out are of polished marble.

No slaughtering can take place in Berlin except at the abattoir, and no meat can be sent away from the abattoir without first being stamped as having passed the expert examination. The inspection is entirely in the hands of veterinary surgeons. They make first a rough inspection of the carcass and cut into the glands of the neck, especially the retropharyngeal. The liver and lungs of every animal must also be cut into by the veterinary surgeon. If the appearances are suspicious he further examines the spleen and the various glands of the body.

Most attention is paid to pigs' flesh, from the fact that so much of it is eaten raw. Of 515,526 pigs slaughtered in the abattoir in 1891, 257 were found to be affected with *trichinae*. One is glad to admit that such a search as has to be made for *trichinae* in Berlin is quite unnecessary here. It takes all the time of 180 microscopists to examine the four specimens taken from the intercostals, diaphragm, pharynx, and abdominal muscles of every pig. Six preparations are made of each of the four bits of flesh. Slides of glass, each with twenty-four divisions, on to which another piece of glass screws down, serve for mounting them. Every animal detected with *trichinae* is branded in several places with a red stamp and destroyed.

The flesh of animals affected with tubercle, but not so extensively as to justify total seizure, and of those in which only a few *cysticerci* are found, is cooked for two hours in boiling water, and twice a week sold to the poor for a trifle.

The animal vaccine station of Berlin is to be found at the abattoir; in Brussels it is at the veterinary college.

COPENHAGEN.

Here again the slaughter of animals can take place only at the abattoir, where, too, the veterinary inspection is made.

Although the private slaughtering-houses were abolished in 1882, the meat control was deferred for five years, in order that the butchers should not be upset by a too rapid transition. The abattoir and cattle market adjoin one another. The newer slaughter-houses are spacious halls, with sufficient room for 120 carcasses to be dressed at the same time.

The inspection is done as follows: All the animals are first inspected as they stand in the market, and any animal found with dangerous infectious disease is isolated and slaughtered apart from the others. None of the organs may be removed until the veterinary surgeon has been his rounds. The latter, after a general inspection of the carcass, cuts into the glands of the neck, examines the

pleuræ, peritoneum, lungs, and liver, and, should there be nothing wrong with them, allows the meat to be stamped with a blue mark as of good quality. If he finds any inflammation or suppuration about them, he undertakes a methodical examination not only of those of the neck, but also of the sub-maxillary, axillary, bronchial, mesenteric, inguinal, and lumbar glands. *Cysticerci* are always looked for by cutting into the muscles at the root of the tongue. Tubercle, when generalised, is deemed a sufficient cause for seizure, but not when localised. A black stamp is freely used to mark meat as of second-class quality, which is not considered sufficiently diseased to warrant total seizure. Attached to the abattoir is a refrigerator room.

In conclusion, one cannot but feel that veterinary science stands on a much higher level in many continental countries than it does in Great Britain, partly from the fact that it receives so much State support abroad, and partly because more scope has been given to veterinary surgeons in the practice of their profession, especially as regards this question of meat inspection. We, in this country, have little in the shape of veterinary colleges that can be compared with the magnificent institutions at Alfort, Berlin, and Copenhagen, where many of these men have had their training.

THE RELATIONSHIP BETWEEN ENTERIC FEVER AND DIARRHOEA.

IN a paper contributed to the Public Health section of the Bristol meeting of the British Medical Association, Dr. H. R. Kenwood advances and discusses the hypothesis that "typhoid may under suitable conditions grow out of acute diarrhoea, and more especially when this assumes the epidemic summer type." He thinks that this mode of origin may explain exceptional cases, which are otherwise veiled in the deepest obscurity. The *modus operandi* suggested is by the evolution of the *B. coli communis* (the number of which is markedly increased in epidemic summer diarrhoea) into typhoid bacilli. Further, Sanarelli's recent work has shown that the likelihood of typhoid infection increases with the number of *B. coli communis* that are present in the stools. Dr. Kenwood says, "It is an established fact that at certain periods and under certain conditions particular bacteria acquire an increased or diminished virulence. Such changes are often induced in the production of vaccines for the purposes of preventive inoculations, but that they occur naturally has now been abundantly proved. V. Babes and others incline to the belief that even the bacilli of diphtheria may exist in an attenuated condition in healthy persons; and if we turn to cholera, there again we find that there are various races of cholera vibrios indistinguishable morphologically, but varying in a very marked manner in their respective degrees of virulence, each giving rise to precisely similar post-

mortem conditions. But since in addition to functional changes there are some slight morphological differences between bacterium coli commune and bacillus typhosus, it is necessary to prove that differences of environment, etc., may be sufficient to produce even these. There is no lack of evidence in support of this.

"In a very short space of time the morphological characters of bacteria may be thus changed so as to effect a departure from the original form at least as pronounced as those slight differences that exist between *B. coli communis* and *B. Eberth-Gaffky*.

"It has been shown that even sunlight may be a factor sufficiently potent to cause, in addition to various profound physiological changes, morphological changes of a most pronounced type. There is much work under this head that one might quote, but it will be well to remind you of the fact that a variety of anthrax quite incapable of producing spores may be got by the cultivation of the spore-bearing bacillus in broth containing very small proportions of certain substances.

"Moreover, this evolution theory gains a strong support from the fact that in cases of typhoid one finds bacteria presenting, as it were, intermediate stages of evolution from *B. coli communis* to *B. Eberth-Gaffky*; and when an attempt is made to discover the latter bacterium in, say, the medium of drinking water, it is always found accompanied by other forms that differ from it in particulars that are so trivial that the identification of the recognised specific organism is fraught with the utmost difficulty."

In taking up the clinical and the pathological aspects of the problem, we do not think that Dr. Kenwood's arguments are quite happy or conclusive. We are strongly disinclined to agree with the statement that "in bad diarrhoea the temperature does not differ in any essential from that of true typhoid, it is always markedly remittent and irregular." The temperature in acute diarrhoea is subnormal during a large part of the attack; the cases of diarrhoea with remittent temperature referred to above are probably undiagnosed enteric fever. Assuming that anatomical lesions are referred to, we should like to have the authority for the statement that "for the most part typhoid fever when it attacks children leaves no such characteristic appearances behind it as when it attacks adults."

Turning to the epidemiological relationships between epidemic diarrhoea and enteric fever, we have difficulty in understanding how the fact that the maximum prevalence of diarrhoea is reached in the third quarter and of enteric fever in the fourth quarter, shows any relationship between the two. Doubtless both are favoured by heat and drought. Dr. Kenwood deals with the main difficulty of his hypothesis very impartially in the following words:—

"The mortality of typhoid, as estimated by the