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ON THE MORBID ANATOMY OF THE CATTLE-PLAGUE NOW PREVALENT IN BRITAIN, IN REFERENCE TO ITS SUPPOSED IDENTITY WITH ENTERIC FEVER.

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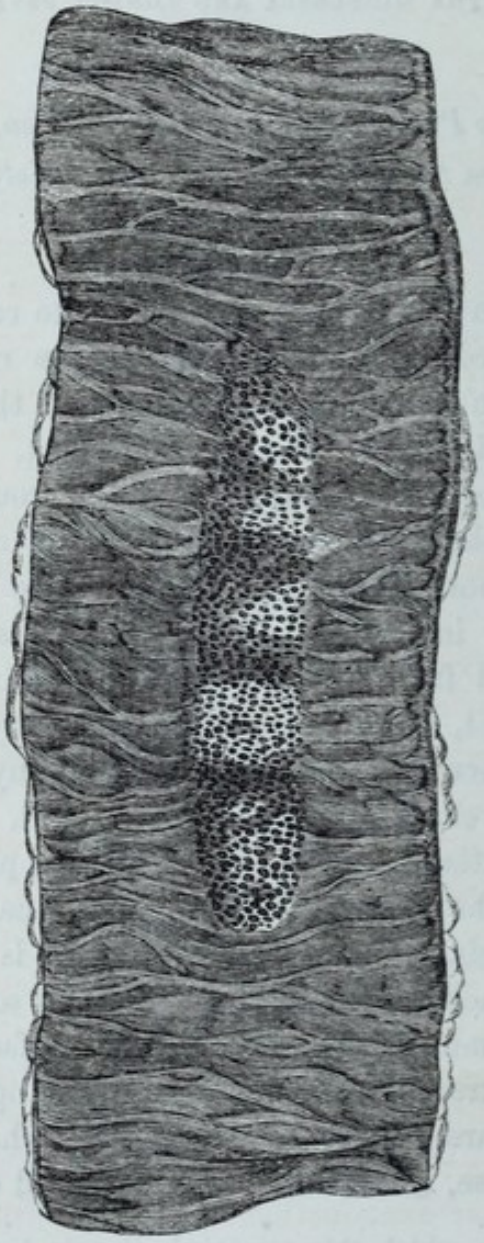
My main object on the present occasion is to call attention to the appearances presented by the small intestine, in reference to the relation which has been supposed to exist between the cattle plague and the typhoid or enteric fever of the human subject.

The *small intestine* is more or less inflamed throughout, and presents the appearances of the ordinary muco-enteritis of cattle. The inflammation is usually most intense about the middle and at the opening into the cæcum, but in extreme cases the bowel is equally affected in every part. Viewed from its serous surface the inflamed bowel presents a blueish aspect, and occasionally small ecchymoses may be seen beneath the serous membrane, but there is never any trace of peritonitis. The coats of the bowel are attenuated and softened. The inner surface, according to the intensity of the inflammation, presents every shade from a rose-red to the deepest claret and occasionally small patches of submucous ecchymosis. The mucous membrane is deprived in a great measure of its epithelium covering, is extremely soft, and is detached from the subjacent muscular coat with unusual facility. It is coated with a quantity of transparent and viscid, or of opaque and puriform, secretion; and in rare cases, particularly those where the vascular injection is most intense, masses of blood, or of solid exudation composed

* The researches, on which this communication is founded, were made two months prior to the appointment of the Royal Commission, and were published in the *Lancet* and *British Medical Journal* for August 26th, 1865.

mainly of epithelial structures, which may be an inch or more in diameter and may be tinged with blood or bile, are found loosely attached to the surface, very often to the membrane covering Peyer's patches, or floating free in the contents of the bowel. On detaching the adherent masses of blood or lymph, the mucous membrane beneath is found to be free from ulceration, though deprived of its epithelium. In not one of thirty cases which I have examined have I found anything like a true ulcer extending through the mucous coat, although in several of the cases the disease had lasted from ten to fourteen days.

Woodcut 1.



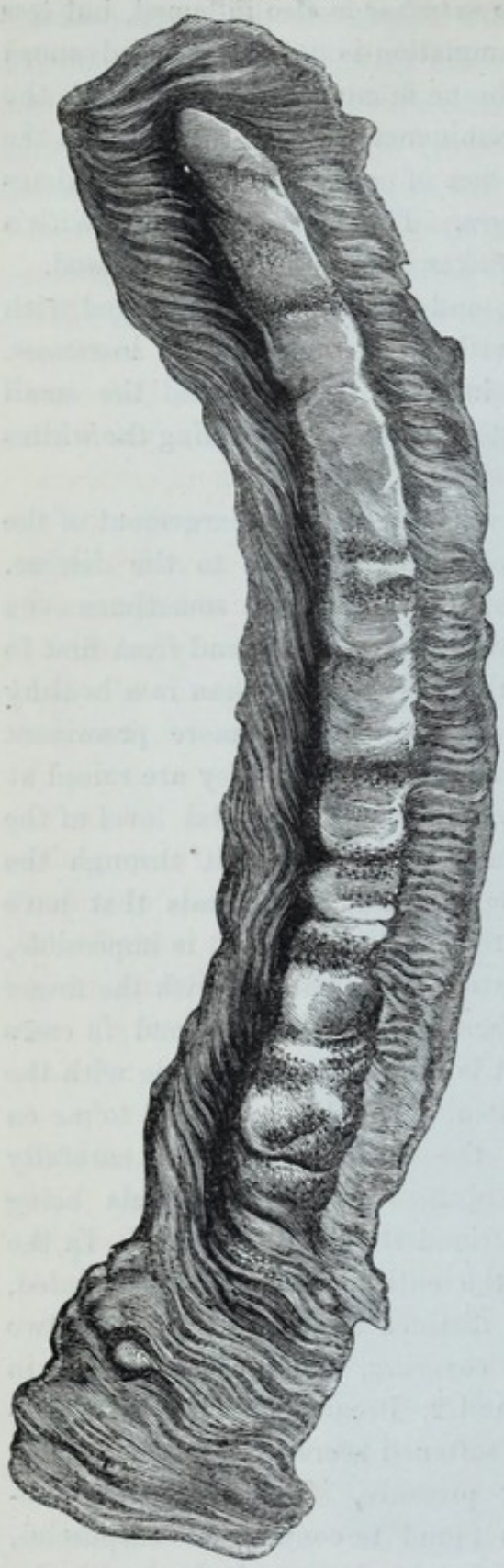
Represents the appearances of a Peyer's patch on the tenth day of cattle-plague, one-half the natural size.

The lining membrane of the *large intestine* is also inflamed, but less so than that of the small. The inflammation is usually most advanced in the cæcum. The mucous membrane is more or less reddened, the redness being greatest over the prominences of the rugæ and in the rectum. Here also may be seen patches of ecchymosis and sometimes superficial excoriations or small ulcers. The surface is coated with a quantity of viscid mucus containing flakes of lymph and often blood.

The *contents of the bowels* are fluid, and consist of fæces mixed with inflammatory products and often with blood. In a few instances, where the inflammation was most intense, I have found the small intestine filled with a gelatinous substance closely resembling the whites and yolks of eggs whipped up together.

Intestinal glands.—I have failed to discover any enlargement of the solitary glands of the ileum which could be ascribed to the disease. Peyer's patches, in the early stages of the disease, are sometimes even less vascular than the surrounding mucous membrane, and from first to last they are much less elevated and much thinner than in a healthy animal. In the healthy ox these patches are much more prominent and developed than the corresponding parts in man; they are raised at least one-fifth or one-sixth of an inch above the general level of the mucous membrane (Woodcut 2), and they can be felt through the coats of the bowel before it is slit open. But in animals that have suffered for six or seven days from the cattle plague, it is impossible, with closed eyes, to indicate the situation of the patches with the finger passed even along the mucous surface (see Woodcut 1), and in cases where the inflammation is extreme it is sometimes impossible with the naked eye to discover any trace of them. This has happened to me on three occasions, on each of which the bowel was twice carefully examined throughout its entire length, two of the animals being examined in conjunction with my friend Dr. A. P. Stewart. In the early stage of the disease, although the entire patch is less elevated, the component glandules are more distinct than in health, for two reasons; 1. Because the epithelium covering, which obscures them in health, has been mostly removed; and 2. Because many of them contain a minute drop of opaque-yellow softened secretion like pus, which can be squeezed out on the slightest pressure. This fluid when submitted to microscopic examination is found to contain pus corpuscles, with numerous transitional forms between them and the corpuscles found in the interior of the Peyerian glandules of a healthy ox. As the disease advances, the opaque-yellow bodies burst and discharge their

Woodcut 2.



Small intestine of a healthy ox, shewing great elevation of a Peyer's patch; one-half the natural size.

Woodcut 3.

Shews enlarged solitary glands in the small intestine of a healthy ox, one-half the natural size.

contents, and the Peyer's patch exhibits a pitted, reticular aspect, owing to the open and empty condition of the glandules. In the same patch certain of the glandules may sometimes be filled with pus, and present the appearance of opaque round bodies about the size of mustard seeds, while others are empty. When the morbid process is still further advanced, all trace of the Peyerian glands often disappears; in rare cases their free surface is coated with lymph; but in not one of thirty cases have I found them to be the seat of ulceration. The changes which take place in Peyer's patches are obviously the result of the general intense inflammation of the mucous membrane. There are no submucous deposits, and none of the lesions running through definite stages to ulceration, which I am familiar with in the typhoid or enteric fever of man.

It is right to mention, however, that in most of the cases which I have examined, many of the solitary glands, and sometimes certain of the component glandules of Peyer's patches, have been greatly enlarged, filled with a soft or firm cheesy matter, and in rare instances (in the case of the solitary glands), even ulcerated on the surface. A drawing of an inflamed piece of bowel studded with these enlarged glands might readily be thought to represent the lesions of enteric fever. Careful examination, however, shews clearly that the appearances in question are of old standing, and quite unconnected with the disease of which the animals have died. They have a peculiarly hard feel, inconsistent with what we find in the enlarged solitary glands in the enteric fever of man, and when cut into they are found to consist of a thick firm cyst, out of which the contents can be scooped or squeezed as a globular mass. Both these characters distinguish them from the lesions of human enteric fever. The microscope, moreover, shows the contents to be made up of oily matter, compound granular cells and granular masses and a few scales of cholesterine, appearances which indicate a chronic rather than an acute affection. But what removes all doubt from the matter, is the fact that I have found precisely similar appearances (Woodcut 3)—usually, indeed, even more strongly marked, in the small intestine of every one of six successive healthy oxen, which I have examined. I remember also Professor Goodsir, of Edinburgh, describing this common condition of the intestinal glands in cattle in his lectures on Comparative Anatomy, nearly twenty years ago. The effect of the general inflammation on these enlarged glands is to render them smaller, and in rare cases to soften their contents into a substance resembling thick cream.

The *mesenteric glands* are sometimes slightly injected, but in most cases they present no alteration of appearance or structure, and they never contain the abnormal deposit met with in the enteric fever of man.

Human enteric fever is characterised by definite and easily recognised anatomical lesions; and, for my own part, I have never been able to discover any analogy whatever with them in those of rinderpest. The alterations of Peyer's patches in the latter disease are clearly the result of the general inflammation of the mucous membrane, and tend to obliterate the glands, instead of rendering them more prominent. Their resemblance to the lesions of enteric fever is much less than that of the condition of the corresponding glands in cases of cholera, small-pox, scarlatina, pyæmia, and other blood-diseases. It is probable that the diminution in the size of Peyer's patches in rinderpest, as compared with the glands in a healthy ox, may be due in part to the length of time that has elapsed since digestion has been arrested, as it is well known that these glands are larger and more developed during the digestive process than during fasting. But whatever be the cause, nothing can be greater than the contrast between the appearance of these glands on the tenth day of rinderpest and on the corresponding day of human enteric fever. In the former case the glands have almost, if not entirely, disappeared; in the latter they are extremely prominent, owing to abnormal deposit in and around the glandules. The contrast is even more remarkable when it is remembered that the glands in the healthy ox are so much more developed and prominent than in the healthy human subject. Moreover, ulceration of Peyer's patches, consequent on the softening and sloughing of morbid deposit, which is the rule in enteric fever, is not found in rinderpest. There was no ulceration or sloughing in any one of thirty cases examined by me; and although it is possible that, in cases of extreme inflammation, there may sometimes be superficial ulceration or even sloughing of the bowel, as well as of the stomach, it is probable that masses of lymph coloured by fæces and adherent to the mucous membrane have often been mistaken for sloughs.

Cattle-plague also differs from human enteric fever in many other anatomical characters, as well as in its duration and extreme contagiousness.*

* These differences are fully considered in my published Report to the Royal Commissioners. The views above expressed are also confirmed by Dr. Bristowe, who, in his able Report to the Commissioners, remarks, "I have never detected any important morbid change, referrible to this disease, in Peyer's patches."

The prominent lesions of cattle-plague, in addition to those already mentioned, are an aphthous condition of the gums and interior of the mouth, nostrils and vagina, extreme hyperæmia with tendency to ecchymosis of all the mucous membranes, minute ulcers, or sometimes extensive patches of sloughing, followed by deep ulcers of the mucous membrane of the third and fourth stomachs; in rarer cases, patches of similar sloughing of the mucous membrane of the larynx, interlobular emphysema of the lungs, or even emphysema of the general areolar tissue of the body, hæmorrhages beneath the endocardium, and an unusually dark condition of the blood.

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