THE NAMES AND SITUATIONS OF THE ORGANS OF THE BODY IN ANIMALS.*

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THE Lecturer said that all the structures in the body that have a function of their own are organs. Thus the skin is an organ of protection, and the bones are organs of support. The chief chain of bones in the body, called the vertebræ or back bone, is supported by the bones of the limbs. There were flat bones, as in the skull, to protect the brain and certain organs of special sense. The ribs protected the chest, but it was not a solid protection, as between each rib was a partition filled with muscle.

As the lectures were directly in reference to the use of animals for food, it was not necessary to say very much about the bones, because there was very little disease in bone which affected the animal for food. There was, however, one disease, of which they had an admirable specimen in the Parkes Museum, called actinomycosis. As a rule it affected the head. Years ago, before the organism which caused this disease was discovered, it used to be classed with cancer, and was probably the origin of the notion that cancer is common in the lower animals, which it is not. Most of the bones of the body were separate and joined together by ligaments. With regard to the joints these would show tolerably well-marked changes if the animal had suffered from such diseases as rheumatism or pyemia. A healthy joint, or a series of healthy joints in an animal, would be almost proof that the animal was healthy—at any rate it would prove the freedom of the animal from any general constitutional disease. The french-grey color on the surface of the joints is indicative of health, and the presence of a colourless, or nearly colourless fluid in a joint, is natural; whereas if there were a discoloured joint, and the fluid within

* The lecture was illustrated with numerous diagrams and drawings, together with a number of internal organs of freshly killed animals.

the joint discoloured, then they would regard that as evidence of it being unhealthy.

Other important organs are the muscles of the body. The muscles are the red flesh. The ordinary individual had an idea that flesh was simply laid on to the bones in irregular masses, perfectly irrespective of action, but observation would show every portion of flesh has its own special function to perform. The muscles are all separate organs, are made up of fibres, and according to the direction of the fibres, so the muscular action takes place. Muscle contracts and shortens, thus moving the bones to which it is attached. Not only are there red muscles, but there are white muscles. The red muscles were the ones under the governance of the will, and are known as voluntary muscles, while the white muscular tissues found in the hollow organs of the body and in one or two other places are involuntary in their action. That is to say, their action went on perfectly independently of the will. Such muscular tissues could be found in the intestines and stomachs. One muscle, however, was an exception to the rule, and that was the heart. The heart consisted of red flesh, and a very complicated arrangement of fibres it is. The muscular tissue of the heart is, of course, required for pumping the blood through the body. That went on whether the owner liked it or not, and therefore, the heart was an involuntary red muscle. An important muscular organ was the tongue. Between the tongue of a horse and the tongue of an ox there was a considerable difference in shape, which rendered it tolerably easy to make sure which was which. The chief peculiarity of the ox's tongue was its long pointed end. The horse's tongue, on the contrary, was long but flattened out and rounded at the tip, so that it was easily distinguished from that of the ox. The gullet, or œsophagus, was a tube which conveyed the food from the back of the throat down into the stomach. The tongue conveyed the food, after mastication, into the gullet, and as this tube was made up of muscular tissue, partly voluntary and partly involuntary, food passed down it without control of the will. It was possible for an animal to reject a portion of food which had just entered the œsophagus, but it was not possible for the ordinary animal to reject it when it got a little lower down.

The bodies of animals practically consisted of two large cavities—the chest and the abdomen. These two cavities were separated by a curtain or partition, called the diaphragm, or by butchers the midriff or skirt. The diaphragm consisted of two parts, the outer or circumferential muscular portion and the central fibrous layer. The muscular portion is attached all round above to the spine, at the sides to the ribs, and beneath

to the breast bone. It was not quite a perpendicular or a flat curtain. It was placed obliquely and was concave on its abdominal surface and convex on the surface facing the lungs. When its muscular part contracted, it became nearly flat, and so pushed back the abdominal organs, and drew air into the lungs. It was not only a partition between two cavities, but was the chief muscle of respiration. It is the muscle which causes hicough by its spasmodic action, and it plays a large part in the action of coughing. Through the diaphragm one or two important structures passed. There was the gullet carrying food to the stomach. Then from the heart large blood vessels ran back through the diaphragm, and large veins from the hind legs and back part of the body also passed through the diaphragm.

The chest had walls partly bone—the ribs—but the abdomen had walls entirely muscular or fibrous. The chest contained the lungs and the heart, two very important organs of the body. The chest was lined throughout by a fine membrane called the pleura, which membrane is reflected over the lungs, so that looking into the chest of an animal when dead, they would find it lined by a clean glistening membrane. There were some diseases which altered the appearance of this membrane very much. In cases of tuberculosis the membrane, which in health would be clear and smooth, would be roughened by the growth upon it of small nodules. As a result of pleurisy, *i.e.*, an inflammation of the pleura, there might be an exudation upon the membrane, or there might be adhesions between the lungs and the pleura. On the healthy specimen before them they would see this glistening membrane on the surface of the lung. It also formed a partition vertically up and down between the two lungs, so that it divided the chest into two lateral parts, and between them would be found the other vital thoracic organ, the heart. Between these layers we also find a number of important glands, the lymphatic glands of the chest which would be referred to later on.

The lungs are bi-symmetrical, and in a state of health absolutely fill the chest. Immediately air was let in in any quantities into the chest, the lungs collapsed, and the air surrounding them formed a space between the walls of the chest and the lung itself. If the lungs exhibited were inflated they would become nearly twice the size, and when blown up their shape would be more exactly that of the inside of the chest than when in a collapsed condition. The horse's lungs presented in front two anterior lobes or additional pieces. In some lungs there was a more complicated appearance than in others. In the ox's lung, for instance,

there was a larger number of lobes, three on one side and four on the other, so it could always be distinguished from that of a horse. There was another difference in the appearance which would enable them to distinguish a horse's lung from an ox's lung. As they knew, the lungs consisted of a series of air cells. These air cells were in groups, and the groups or lobules were pressed together and covered by the pleura. Now if they cut into a horse's lung they would find it fairly homogeneous throughout, and the lobules could not be separated from each other, but if they cut into a bullock's lung they would find the various lobules constituting the lung clearly defined by the intervening tissue, and if they were torn the lobules could be easily separated from each other. The colour of the lungs was a reddish pink, varying a good deal according to the amount of blood left in the animal. In the carcase of an animal not bled, the lung on the side it laid on after death would always be twice as dark as that on the other side. The lungs were soft and elastic to the touch, but sometimes they got a lung which did not feel soft and elastic. For instance, an animal that had never breathed would have solid lungs, and animals that had suffered from inflammation of the lungs often had solid patches in those organs. A portion of healthy lung ought to float in water, a portion of hardened lung, as a result of inflammatory changes, would not float in water, nor would the lung of an animal that had never breathed. Among the articles provided for food for human beings are calves that have never breathed—some of them, in fact, have never been born, although this is not so common as it used to be. If therefore, they wanted to settle the point of whether an animal had breathed, they had only to get the lung, notice if it sank in water, and they could determine the question. Morbid changes occurred in the lungs. There were parasitic diseases, tumours, cysts varying in size from that of a nut to that of an apple. Hardening of portions of the lung resulted from specific disease, and tubercular nodules were common in and on the lung. A contagious disease which used to be common, pleuro-pneumonia, marked the lungs very clearly. Not only was the part thickened and hardened, but when it was cut into it was marbled, yellowish streaks, running through a firm tissue of different degrees of colour, from pink to red or even to black.

The heart was situated in the chest between the two lungs, and was well protected by the shoulders. It was not on the left side, but it was in the centre, and it beats a little more to the left than to the right, therefore, it was felt more to the left than to the right. The heart was contained in a bag known as the pericardium. After death a little fluid would be

found in this bag, it was more a sort of vapour during the animal's life, and facilitated the movement of the heart. The bag of the heart was fixed to the sternum—the breast bone—and it was further held in its place above by the attachment of large blood vessels which ran backwards and forwards and into the lungs. The most marked difference between the heart of a horse and an ox was the fat. Without any other sign they could always tell the difference between a horse's and an ox's heart, because in the ox the fat is hard and firm, whereas in the horse it is soft and greasy. On the surface of the heart of a horse there were two furrows, running down towards the point. In the ox there were three of these furrows. If they wanted further distinctions they could put their fingers into the openings of the blood vessels, and in the septum which divided the right from the left cavity, they would find a bone in the ox's heart which is tolerably diagnostic of the animal it belongs to. The ox's heart weighed from 4 to 6lbs. The horse's heart weighed from 6 to 7lbs., and ran up in the case of large horses to 9 or 10lbs. or even more. Attached to the pericardium was one very large gland, known to butchers as a sweetbread. Where the wind-pipe branches into the bronchi, one for each lung, there is a mass of glands, the bronchial glands, and underneath on the other surface of the wind-pipe there are another set of glands, the tracheal glands. These were important to men who had to inspect food, so their situation should be remembered.

The abdomen, or cavity behind the diaphragm, contained all the organs concerned in digestion, and a few other organs. The stomach was in all but ruminating animals a single organ, hollow, and bent upon itself something like the shape of a haricot bean. All the abdominal organs were covered, like those in the chest, by a fine membrane, called the peritoneum. Just as the pleura lined the chest, so the peritoneum lined the abdomen, and was reflected over each of the organs in that cavity. If they cut open a stomach or intestine, they would not find a firm hard membrane, but they would find a softer membrane generally covered with mucus; that was the mucous lining of the abdominal organ. The stomach and intestines had a mucous lining, and they had a muscular coat which enabled the organ to make certain movements. Those movements were slow contractions, and were sufficient to carry the food through one digestive part to the other. In ruminants, the ox and the sheep, there was a set of stomachs unlike what was found in other animals. The food passed down the gullet into the rumen, a large bag in which not a fourth part of digestion takes place. This rumen is known as the paunch

when dogs are fed on it, but as tripe when men are fed on it. It was the receptacle for the hurriedly swallowed food, and ruminants could store an enormous quantity there, enough, in fact, to fill a wheelbarrow. When the animal was thoroughly distended, it would lie down or sometimes stand quietly and enjoy the process of rumination. The rumen is tolerably well recognisable out of the body, or even a portion of it, because it had what none of the other stomachs have, large masses of white muscular tissue which form bands across the stomach, and partially divide it into two different sections, in fact, almost into four. These were muscular bands or contractile organs which enabled the ruminant to force food from the rumen back into the mouth. The rumen had a very much smaller bag attached to it called the reticulum, which was called so on account of the curious arrangement of its lining membrane. Even a small section of the stomach enabled a man to recognise what it was because the mucous membrane formed a distinct honeycomb pattern, the edge of the honeycomb standing up well above the rest of the membrane. Ruminants had a third and a fourth stomach. The third stomach is known as the omasum or many plies, its mucous membrane is artistically arranged in a series of parallel folds standing up over an inch in height, and between them was generally found a mass of hard food. From this omasum the food passed into the true digestive stomach, the stomach which digests the nitrogenous matter; this fourth stomach is called the abomasum or rennet. These first three stomachs of the ox are to be looked upon, not as true digestive stomachs, but as receptacles which prepare the food for digestion in the fourth stomach. From the abomasum, as in other animals, the food passes directly into the intestines.

The intestines consist of two kinds, the small and the large. In such animals as the dog and other carnivorous animals, the division into large and small intestines is, anatomically, more or less imaginary. These animals have an almost straight intestine, varying little in calibre. In the horse and ox the difference between large and small intestine is very apparent. The small intestines of the ox are more conspicuous for their length than anything else; they are twice as long as those in the horse, and stretch to 120 or 140ft. The pig has 72ft. altogether, 56 of which are small intestine; the cat and dog have very short intestines—digestion in the carnivora taking place nearly entirely in the stomach. Animals with large intestines have a considerable amount of intestinal digestion, chiefly, of course, of the hydro-carbons of the food.

The liver is situated just at the back of the diaphragm. The horse's liver rests on the left side, and extends on both sides of

the diaphragm, with a little more on the right, but the ox's liver is almost entirely on the right side of the diaphragm, because the ruminant required more room on the left side for the large stomachs. An ox liver weighed about 8 lbs. The colour was dark brown, not varied, and its surface was smooth, firm to the feel, and homogeneous. Variations in colour would be a little suspicious, but variations of colour pointed to diseases which he did not think would do much harm to other animals consuming them as food. A discoloured liver might be described as unmarketable, and the inspector would be quite justified in preventing its sale if there were evidence of some degeneration or fatty change of the organ. Worse than these were the livers containing spots of different colours, or little tumours varying in size, the solid ones being probably tuberculous in their nature, and the hollow ones containing fluid being parasitic. The presence of one parasitic cyst in a liver would not warrant the conclusion that the liver is not healthy; the cyst could be cut out and the rest made good food. The ox had a square-shaped liver with a little separate lobe on its under surface; the horse had a liver more artistically made up of three lobes; the pig's liver had five or six lobes; the sheep's liver was the same shape as that of the ox. The difference in the number of lobes would enable them to differentiate between a pig's liver and that of a sheep.

The horse had no gall-bladder, and in that he was absolutely distinct; all solid-hoofed animals were destitute of a gall-bladder.

The spleen was an organ attached to the stomach, in the ox to the rumen. The horse's spleen was of crescent shape with two points, wider in the middle tapering off at both ends. In the ox it was square at the ends, a useful distinction. The spleen was a mottled grey colour, and was made up of a fibrous network containing a pulp; it was known to butchers as the milt. In some diseases the spleen was enormously enlarged. During digestion the spleen of all animals becomes distended. It was an organ capable of healthy distention and contraction to its normal size. It was a marked sign of anthrax in the ox when the spleen was ten times its natural size, and very easily broken down with the fingers, about as dangerous a thing as anyone could do. Before anthrax was diagnosed as an organismal disease it used to be called splenic fever, and people made these dangerous *post mortems* with innocence. Government now almost forbade such *post mortems*, and specially warned persons that they were not to be made if the operator had a scratch on his hands.

Another gland in the abdomen, the pancreas, was concerned

in digestion. In the horse it was just behind the liver, lying across the spine; in the ox it was situated a little lower down in the folds of the mesentery. All the intestines were held together from the spine by folds of the mesentery.

The kidneys were found a little further back still, attached to the spine; in the ox the kidneys were extremely large and tabulated, in other words they are made up of a number of simple kidneys aggregated together. The kidney of the pig was of squarer shape at the ends. The shape of the horse's kidneys was different, one kidney being quite a heart-shaped object, but the other more the shape of a sheep's kidney, something of the form of a haricot bean.

Having described the bladder and the uterus, with their diseases, the lecturer turned to the lymphatic glands, which he said were extremely important and very interesting. A large number of these glands were sold as sweetbreads, and it was very necessary to ascertain that there was no disease about them. He described the glands in the various parts of the body, their functions, and appearance. Tuberculosis affected some of the glands more than others, such as the mesenteric, the mammary gland, the throat glands, and the bronchial; and these required careful inspection in the slaughter-house. These lymphatic glands were placed all over the body, and might be looked upon as sentinels to detect any impurities which might pass into the system. If therefore they met with suspicious signs in any internal organ, let them examine the nearest lymphatic gland, and if they found it enlarged or changed in colour, or presenting hard nodules or white spots in their centres, they would know disease was present. This was important, because if they had to examine a carcase with all the viscera removed they must cut into the lymphatic gland, and if disease had passed from the internal organs into the tissues it would have infected the glands. If not, they might conclude that that carcase was not infected generally, and was therefore fit for consumption.