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In view of the increasing importance of a knowledge of poultry diseases the writer has undertaken a brief study of the anatomy of chickens. The subject being quite a large one, it is deemed best to confine the attention to certain parts that are of particular importance in medicine and surgery. The frequency of digestive troubles, tuberculosis, aspergilliosis, syphilis, and other affections of the digestive and respiratory tracts show the importance of these two systems. The close similarity of these systems throughout almost their entire extent makes

Relational Anatomy of the Respiratory

and

Digestive Tracts of Chickens.

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The mouth of birds differs much from the mouth of mammals. In birds the lips and teeth are absent and in their stead are the two hard, horny mandibles which come into apposition when the mouth is closed. Food is carried back to the pharynx by a backward movement of the tongue and without being masticated. The tongue is of a hard horny character and devoid of the taste buds as seen in mammals. It begins in a sharp point. The posterior extremity is broad from side and has a fringe of scabrous rasping bristles in a transverse direction. There is a corresponding fringe on the hard palate above. This fringe of scabrous bristles serves to grasp particles of food and carry them back over the glottis as the tongue curves back. There is a smaller fringe behind the glottis.

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In view of the increasing importance of a knowledge of poultry diseases the writer has undertaken a brief study of the anatomy of chickens. The subject being such a large one, it is deemed best to confine the attention to certain parts that are of paramount importance in medicine and surgery. The frequency of digestive troubles, tuberculosis, aspergillosis, cytodites, nudis and other affections of the digestive and respiratory tracts show the importance of those two systems. The close contiguity of these systems throughout almost their entire extent makes them an attractive field for research and makes it convenient to study them both at the same time. Other parts of the anatomy will also be mentioned whenever it seems to be necessary.

The works of Martin, Chaveau, Owen and Ellenberger and Leasuring have been frequently consulted but the greater part of the information has been obtained from the writers own dissections.

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The nostrils are passages of considerable complexity. Their external openings are in the superior mandible and are covered by flexible cartilaginous wings. The passages run backward to communicate with the mouth by a narrow slit in the hard palate. A diverticulum or sinus runs upward from the nostril in the direction of the eye.

The larynx opens in a peculiar way. There is no epiglottis. The glottis is a longitudinal slit and closes by its lateral margins approximating each other.

The oesophagus and trachea pass down side by side, the former at the right and the latter at the left. The oesophagus is very elastic and is capable of great distention. Its mucous membrane is well supplied with glands which keep it covered with a thick coat of mucus. The trachea differs from that of mammals in that its cartilages are entire rings.

Just in front and between the pectoral muscles a great dilatation in the oesophagus occurs, forming what is known as the ingluvies or first stomach. The mucous membrane of the ingluvies is much the same as that of other portions of the oesophagus except that it contains glands that secrete a digestive ferment known as ingluvina.

From the ingluvies the oesophagus is continued backward and passes from the right to the left side of the median line. Running above the base of the heart, it is related first with the left side of the trachea and then passing under the right bronchial tube, it reaches the left side of the spinal column. Superiorly the oesophagus is related with the longus colli muscle for a distance and later is similarly related with the lungs. It ends in a dilatation called the proventriculus.

The proventriculus is the true secreting stomach. On its right it is closely related with the left lobe of the liver. Posteriorly it is related with the spleen. It is constricted at its posterior extremity where it joins the ventriculus bulbosis. Externally or on its left it is related with the

left anterior diaphragmatic air sac. The proventriculus is much smaller than the ingluvies and has thicker walls. Its posterior half is surrounded by a band of fat which varies in quantity with the condition of the bird.

The ventriculus bulbosis lies on the left side of the mesial abdominal septum. It is related on the left with the left abdominal air sac and the abdominal wall. Posteriorly and on the right it is related with the right abdominal air sac and the folds of the small intestine. It is a very large and muscular organ, bean shaped, flattened from side to side and having its concave border upward. Its pyloric opening is near the entrance but is much smaller. It is guarded by a valve. Upon the ventriculus bulbosis devolves the duty of masticating the food. Its mucous membrane is very tough and of a horny consistency. In all healthy fowls this stomach is found to contain sand and small stones which with the contraction of its muscular walls grinds the food just as the teeth of mammals do.

The duodenum or first division of the small intestine begins here and passes back along the inferior surface of the right abdominal air sac. It is reflected to the left at the posterior border of the ventriculus bulbosis when it makes a sharp bend on itself and returns to its point of origin. Here it comes in contact with the right lobe of the liver and bends abruptly upward to become the jejunum. The duodenum floats free in the cavity but the two limbs of its loop are attached to each other.

The jejunum and ileum are coiled in the cavity, the upper part of which they occupy, being held up by the abdominal air sacs. They are related superiorly with the kidneys genital organs and the abdominal walls. They are suspended or rather attached to the abdominal parietes by a broad mesentery which descends from near the origin of the great mesenteric artery. This artery takes origin from the aorta at the sixth intercostal space and forms twenty one loops in the mesentery, supplying all of the small intestine and the pancreas.

The ileum becomes the colon at the origin of the two caeca.

The two caeca are two retrograde blind pouches which perform digestive functions. They pass forward mingling with the small intestines. The left one is usually longer than the right.

The colon is of about the same diameter as the small intestine. It floats free and passes insensibly into the rectum which ends at the cloaca. The colon lies in contact with the folds of the small intestine and the abdominal air sacs. Superiorly the rectum is related with the ureters.

Two accessory organs of digestion here deserve mention. The liver is very large and well developed in chickens. It consists of two well defined lobes of nearly equal dimensions, and lies nearly in the center of the body cavity. It is related antero-superiorly with the lungs and heart, the heart being between its lobes. The right lobe is related on the right and superiorly with the right anterior diaphragmatic air sac. Posteriorly it is related with the duodenum and the right abdominal air sac. The left lobe is related externally with the pro-ventriculus and posteriorly with the ventriculus bulbosis. Inferiorly the liver rests on the sternum. The right lobe is deeply cleft in its posterior border.

The gall cyst is large. It is located on the superior surface of the left lobe near its inner border. A duct leads from the liver to the cyst and another from the cyst to the duodenum at a point near its origin from the ventriculus bulbosis.

The pancreas is large and peculiar in shape and position. It is situated between the two limbs of the loop formed by the duodenum. It is long and slender in form and branched at its point of contact with the ventriculus bulbosis. The gland is gray in color. There are four or more ducts which carry its secretions to the duodenum.

The respiratory and digestive tracts being common at the mouth have been discussed together. The larynx and trachea have also been described. Just before it reaches the lungs the trachea divides into right and left bronchi and

at this point there occurs a modification in its form and structure which is called a second larynx. This is also called the syrinx. This is the organ in which the voice is produced. The syrinx is not well developed in chickens. The cartilagineous rings are modified here. They are not complete as in other parts of the trachea. A thin membrane takes the place of the cartilages about one-half of the way round. Vibration of a fold of this membrane produces the voice. The two branches formed at this division goes to their respective sides of the lungs.

The lungs differ very much from those of mammals. They are less elastic, expand less when inflated, and are firmly attached to the ribs above. The bronchial tubes branch in a peculiar way and often anastamose. There are openings on the surface of the lungs to communicate with the air sacs of which there are nine in chickens. The lungs are related superiorly and laterally with the chest wall. Infero-posteriorly they are related with the heart, the liver, the oesophagus, the proventriculous and the anterior diaphragmatic air sacs.

The air sacs are the most interesting of all the respiratory system. They are very closely related with the digestive tract, and are of interest from the stand point of both medicine and surgery. The interclavicular air sac is small in chickens. It lies in a space in front of and between the pectoral muscles. It is supposed to communicate with the interior of the sternum. This communication, however, if it exists at all is not very distinct in chickens.

The cervical air sacs occupy a space under the wings. They are heart shaped reservoirs and communicate with the interior of the coracoid and humerus. These sacs are distended when the wings are extended and are compressed when the wings are at rest.

There are four so called diaphragmatic air sacs so named from their relation with the two rudimentary diaphragms. The two anterior diaphragmatic air sacs are located behind and beneath the lungs. They extend from the posterior border of the lungs back to the fourth rib, and downward to the edge of the sternum. Externally they adhere closely to the ribs and the wall of the body cavity.

Internally each sac is related with its respective lobe of the liver. The left one is also related with the proventriculus internally.

The two posterior diaphragmatic air sacs extend from the posterior border of the anterior ones to a point beyond the last rib, that rib marking their center. They both adhere to the ribs. The right one is in contact with the mass of intestines and the right abdominal air sac on its inner face while the left is related internally with the ventriculus bulbosis. Both are related posteriorly with the abdominal air sacs.

The two abdominal air sacs are the largest. When they are inflated they occupy more than half of the abdominal cavity. They are in direct contact with the intestines and the ventriculus bulbosis throughout a great part of their surface. The right one is the largest and occupies the right and central parts of the cavity. The great mass of the intestines lie on its superior surface, but the duodenum lies beneath it upon the floor of the abdomen. The left abdominal air sac is crowded to the wall by the ventriculus bulbosis in its anterior part. Its posterior part extends beyond the ventriculus bulbosis and is in contact with the intestines and its fellow of the opposite side.