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THE ANATOMY OF THE HEN.

Familiar as many of us are with the outward appearance of our fowls, and familiar as well with their internal structure as discovered by kitchen dissections, we doubt not many will gain from the engraving on this page a clearer idea than they had before of the anatomical arrangement of the birds which stock their yards. The knowledge which can be gained by study of the engraving will not only increase our general information, but affords all an opportunity to become acquainted with the names and relations of the different parts, and this will prove of practical value to the poultry grower in many obvious ways.

Our illustration is from a drawing for the Boston *Scientific Farmer*, by C. J. Maynard, and is the first of a series of papers on the anatomical structure of birds, which he is preparing for that valuable journal. It represents a section of a common fowl, such as would be shown in nature by removing the outer covering of flesh and feathers until the interior organs were all brought to view in their natural positions. The following is the explanation of the lettering upon the engraving:

A, nasal cavity; *B*, salivary glands; *C*, trachea or windpipe; *D*, œsophagus or gullet; *E*, crop; *F*, lower gullet; *H*, proventriculus; *G*, stomach or gizzard; *M*, pancreas; *N*, duodenum; *O*, intestine; *d*, cœca; *i*, comb; *l*, spleen; *b*, ovaries; *e*, ovaduct; *P*, eggs in "uterus;" *Q*, urogenital passage; *R*, vent; *s*, sternum; *U*, furcular; *V*, lungs; *S*, kidneys; *X*, vertebræ of neck; *L*, heart; *K*, bones of toes; *W*, bronchial tubes; *J*, gall; *T*, keel of sternum.

In order that the relations of some of the leading organs to each other may be seen, we shall, at this time, quote from Mr. Maynard's writings a description of the passage of food through the fowl. We may hereafter make further allusion to the drawing in description of other operations of the animal economy.

All extant birds differ from most mammals in having no true teeth. The elongated bones which form the jaws or mandibles, are simply furnished with a horny sheath having straight, sharpened edges, but in the example before us no adequate means are provided by which the food can be masticated. Thus, although fowls, by constantly pecking at animal and soft vegetable substances, may tear them into small pieces, yet it must swallow these as well as hard grains, without further change when they are once taken into the mouth.

Upon examining the interior of the mouth, we find that the upper portion is provided with thick, horny skin, divided near the center by a longitudinal slit, having scalloped edges. This is the nasal opening, and is so narrow that there is little or no chance for any substance taken into the mouth entering the cavity above. (Letter *A*.) It is notable that the roof of the mouth is provided with small flexible projections which all point backwards. These papillæ are arranged in transverse rows and groups, and in absence of any well developed muscular apparatus for swallowing, greatly aid in causing the food to take a downward course.

The tongue is a horny, sheathed organ in this case. Although the hyoid bones which support the tongue are encased in muscle, it is capable of but little extension. At its base is the superior larynx, also provided with reversed papillæ, some of which guard the entrance to the wind-pipe or trachea, shown at letter *D*. The food, in its passage to the gullet or œsophagus, becomes imbued with a kind of mucus secreted by two glands, the position of which may be seen in letter *B*. These are the sole representatives of the salivary glands of mammals. The gullet (letter *D*) is provided with a slimy lining, the mucous membrane, which is only an accessory to the act of swallowing, however, along which the food glides, and enters the large expansion called the crop. (Letter *E*.) In this reservoir the food, after being mixed with the water taken by the fowl which is kept at a high temperature by animal heat, undergoes maceration. The contents of this receptacle enter the lower gullet (letter *F*), which is similar to the upper, in small quantities, passes along it into the accessory stomach or *proventriculus*, (letter *C*.)

The walls of the first stomach (*proventriculus*, letter *H*) are composed of numerous glands, packed in the smallest possible compass. These glands are of a somewhat peculiar form, being furnished with bulbous projections, in one of which there is an orifice through which the secretion flows into the cavity of the *proventriculus*. This fluid, or gastric juice, although highly digestive, has no influence on unbroken grains of any kind. During the passage of food through the cavity, quantities of this fluid are exuded, and, with the material to be digested, pass through the stomach or gizzard, (letter *G*.) This organ, the stomach, is provided with a muscular covering, greatly thickened at the sides, while the extremities are much thinner.

The internal membrane consists of a horny lining much roughened. The peculiar muscular arrangement of this stomach is admirably adapted to the purpose for which it is intended; that of grinding hard grains. The thick, red muscles of the sides, are placed in longitudinal layers, while the thinner, bluish or white, but finer muscles of the upper and lower surfaces, and of the extremities, are placed transversely. Thus an opposite or grinding motion, though slight, is imparted to the roughened sides of the interior. This alone, however, is insufficient to act upon the outer coverings of grains, even though they have been macerated and swollen to the utmost extent by the juices of the crop and *proventriculus*.

Conscious that it requires an additional medium to assist in abrading the hard grain, the fowl picks up and swallows hard stones, which, in addition to the supplied motive power, completes the mill. Thus, although a fowl might be provided bountifully with unrushed barley, corn, etc., yet it would grow thin and finally starve, were it not allowed access to gravel or some other hard substance of a convenient size. I have found that grains of corn taken from the interior of the stomach farthest from the *proventricular* entrance, showing that they had been in the digestive cavity for some time, yet having escaped abrasion, sprouted readily. This proves most conclusively that the gastric and other juices are incapable of dissolving the outer coverings of the kernels. Other grains of corn, taken from the same stomach, although only slightly scratched, began to digest under the influence of the powerful solvent juices.

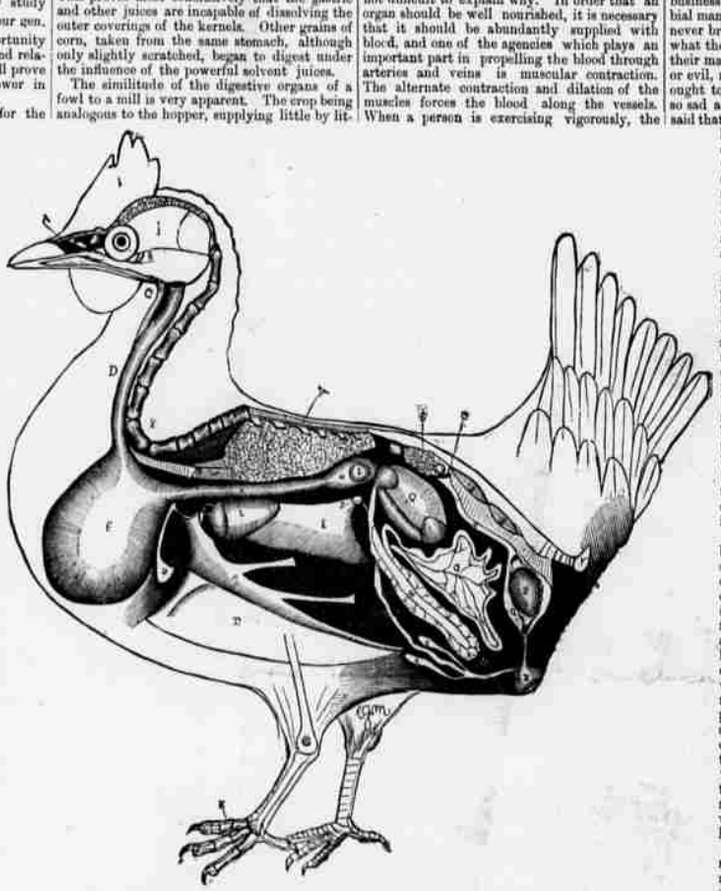
The similitude of the digestive organs of a fowl to a mill is very apparent. The crop being analogous to the hopper, supplying little by little, the restrictive capacity of the powerful apparatus of the gizzard, which represents the stones. As the orifice from the crop to the lower gullet is comparatively small, there is danger of its becoming obstructed. This is frequently the case when fowls are allowed access to green vegetable food, after being deprived of it for some time. They then are apt to eat greedily, taking in too large pieces of leaves, grass, etc., to pass the orifice, consequently they die of starvation with the crop filled to overflowing. I once dissected six or eight fowls which had all died within a short time, from over-crowding the crop with large pieces of the tough leaves of the common plantain (*Plantago major*).

Many years ago I noticed that the sound, caused by the grinding motion of the gizzard, could readily be perceived by applying the ear to the side of the bird, and in this way used to judge of the physical condition of my pets; a vigorous working of the mill indicating perfect health. I have also noticed that this motion is more or less voluntary; that when the bird was badly frightened the sound would cease.

After the contents of the stomach have been submitted to the grinding and solvent action of that organ, they pass out of the orifice known as the pyloric opening, which in birds is in close proximity to the *proventricular* entrance. This exit is guarded by a species of valve, which does not admit of the passage of stones or other large objects, unless the stomach becomes greatly distented. Thus only that portion which has become dissolved or ground very fine passes through. The digested matter, called chyme, goes onward through the fold of the intestine, known as the *duodenum* (letter *N*), which encloses that peculiar gland, the pancreas (letter *M*).

The coarser portion of the chyme ishere submitted to the solvent pancreatic juices, which enter directly into the intestine through a duct. The bile also enters the intestine at about the same place. From this fold, the chime enters the small intestine, where the lacteal vessels abstract the nutritious portion, known as chyle, and convey it to the arteries. The residue, passing downward through the larger intestine, is further submitted to a system of lacteals, situated on the accessory intestine, (letter *d*). These are simple sacks, (cœca), having blind ends, where the process of absorption is prolonged to the utmost, before the refuse matter passes into the large intestine (letter *o*) to be discharged at the vent.

There yet remains to be mentioned a prominent organ; the function ofwhich is only partly understood by anatomists. This is the spleen (letter *I*). It is a ductless gland, but as it is furnished with an artery, it is probable that the blood here undergoes somechange. I cannot help associating the function of the spleen, in some way, with the growth of the eggs in the ovaries; as when the breeding season approaches, I have always found that the spleen is greatly enlarged; often becoming three or four times its normal size. Still this may be accounted for, by the requisite supply of blood atsuch times; but I am inclined to attribute some special egg-producing function to the spleen, though this must be supplied somewhat indirectly to the ovaries.



IDEAL SECTION OF A COMMON FOWL, BY C. J. MAYNARD.

Influence of Exercise on the Lungs.—One of the conditions of perfect health is physical exercise. In its absence the whole system suffers deterioration and falls short of that development which is necessary to the vigorous action of the different organs. More than any organ, however, do the lungs suffer; and it is not difficult to explain why. In order that an organ should be well nourished, it is necessary that it should be abundantly supplied with blood, and one of the agencies which plays an important part in propelling the blood through arteries and veins is muscular contraction. The alternate contraction and dilation of the muscles forces the blood along the vessels. When a person is exercising vigorously, the respiratory movements become greatly increased, the air vesicles become dilated, the blood is propelledthrough the minute capillaries which constitute a large portion of their structure, and the lung tissue receives the nourishment which it requires, and which is necessary to its integrity and efficient action. From insufficient bodily exercise, then, the lungs suffer in two ways—viz., for want of sufficient blood to nourish them and for want of necessary expansion. The result is that the lungs, more frequently than any other organ, become affected in those who lead inactive lives. This fact makes it incumbent on all, and especially on those who have weak lungs, to spend a portion of each day in vigorous physical exercise. We mean by this exercise which calls into vigorous action all the muscles of the body; exercise which causes the skin to glow, the perspiration to start. Two hours of this kind of exercise each day is not too much; and it should be performed, when possible, in the open air. A celebrated French physician says that a person, to be healthy and strong, should exercise to the point of perspiring every day.

Remedy for Obesity.—According to Dr. Philbert, the waters of Brides in Savoy, which are very similar to those of Carlsbad, are very useful in the treatment of obesity. The purgative salts contained in these waters are sulphate of soda, chloride of sodium, chloride of magnesium, sulphate of magnesia, and sulphate of lime. To increase the effect, from 15 to 80 grains of sulphate of soda are added to each glass of mineral water. The quantity taken daily is four-fifths of a quart, divided into three doses, and the purgative effect is produced in two or three days. The course may last from four to six weeks. As an adjuvant to the waters, a vapor bath may be taken every day or every second day. Farinaceous and saccharine articles of food are not allowed, and brandy, liqueurs, and coffee are interdicted; but the quantity of food is not limited, and a moderate amount of wine may be taken without harm. Muscular exercise is considered indispensable, and the mountains in the vicinity of Brides afford every facility for walking, where, in addition, this treatment may be followed by the grape cure.

MEN'S PART IN HOME-MAKING.

Most of the preachments we have seen from the text of happy homes have been aimed at the women. This is natural enough, for they are the home-makers of the world; but just now we desire to nudge the heads of the households, and ask them how they are performing their responsible part in the realm of home. Their forte lies in breathing and enjoying the atmosphere after somebody else has made it—and not a few can't get along and make known their authority without "raising a breeze" in it. Men are too busy, too much pre-occupied, too impatient and thoughtless, and—it must be said of some of them—too selfish to do their fair share of that pre-eminently millennial work, the creating of a happy home, wherein love reigns supreme, and amiability, affection, cheerfulness, joy and peace are the natural conditions of family life.

Now in certain things man has been a constitutional *shirk* from the time of Adam—if the scientific gentlemen have left us any Adam—down to this day. Men will fight for their homes, and make slaves of themselves to their business to maintain them; but like the proverbial man who would die for a woman, but would never bring up a scuttle of coal, they can't tell what their children are studying at school, who their mates are, what they are learning of good or evil, nor hardly anything else that a father ought to know concerning his offspring. It is so sad a fact as to spoil the satire, when it is said that many a father finds his Sundays and holidays too few to enable him to "become acquainted with his boys." But we maintain that a man who *hasn't time to be a father to his children, with all that includes, has no right to have any.* He wrongs them, robs himself, puts an unjust responsibility upon the mother, and neglects his highest duties, human and divine.

There are so many ways in which a father may contribute to happy home life that it seems strange the number of houses should greatly exceed the homes. It takes so little to make children happy at home, that it is a wondrous pity so many little ones are miserable, or uneasy, or discontented. If for an hour after the evening meal the father should give himself to his children, would the mother wear out so fast, or the children be so lawless, troublesome and uncomfortable? What a ministry for good to both parties is a papa's frolic with the babies! What an interest is added to the books, the drawings, the games, or even the studies if the father enters into them.

Aside from the children, and in homes where haply there are none, men still have a more direct part than most of them are ready to bear, in making the daily life pleasant. We hardly need say that a man should set the example for the family in patience, cheerfulness, courtesy, forbearance, and all the amiable moods and graces that are the soul of home happiness. The sort of men who display all their suavity and politeness on the street or at their business places, and save the storms and sulks, and sourness and all the evil brood of develish dispositions that they characterize by the convenient euphemism of "mood"—well, we have our opinion of them! and if they will come within range, we don't mind expressing it privately; but we are afraid it wouldn't look well in print.

The whole tribe of home tyrants—men who make the entire household revolve around them as the center; whose tongues are chronically "furred" in the morning, and nerves so upset in the evening that the family must keep silence while they read and smoke; who "can't bear" the noise of innocent and natural mirthfulness; who have to be toadied and tended and humored; they ought all of them to be doomed to pass their days in a shabby-genteel boarding house, without sight of wife or children—with hash for breakfast, warmed-over pancakes for lunch, and lean mackerel and centennial hens for supper, with the lodger overhead always learning the trombone and servant girls that steal the hair-oil. They don't deserve a home, and no man does who will do nothing to make it. For man's rights do not include the right to all the comforts of a home without any of the work, or worry, or self sacrifice, or thoughtfulness and well-doing incident to its creation and maintenance.

A good many men think they have done their full duty if they pay the bills, more or less grudgingly. But one might as well try to warm a room with a fire-place and a pair of silver-plated andirons, and no fuel or fire, as to make a home with money. The money simply makes a place for the home; to complete it the man must put in himself, and the best part of himself at that.—*Golden Rule.*

Detection of Trichina.—In recent years some attention has been attracted to the *Trichina*, one of the most formidable of human parasites. It is known that this microscopical worm, encysted in pork, is therewith conveyed into the alimentary tube of man, and penetrates into the tissues of the muscles, causing intolerable pains, and even sometimes death. This very year a number of cases of trichinosis have been met with among the soldiers of the German garrison of Thionville. To detect the trichina, suspected meat is often examined with the microscope, but the method of examination is rather inadequate. A Russian servant, M. Tikhomiroff, has suggested a new mode of isolating the muscular fiber. He divides the pork into small pieces, and sets it to digest for about half an hour with an equal volume of chlorate of potash, to which is added four times as much nitric acid. The muscular tissue thus treated is put into a flask with distilled water and agitated till it separates into its fibrille. These latter present, when the meat is infested with trichina, whitish fusiform swellings, observable with a lens, and in which the microscope reveals the presence of trichina.