

superior mandible, has, owing to a peculiar union with the cranium, a mobility which is not seen in mammalia. The two nostrils, placed in the middle of the superior mandible of the beak are narrow, and their projection of no account. The nasal cavities are not deep, and are equally separated by a septum. They open in the interior of the mouth by a simple slit, long, narrow, and longitudinal, and furnished with small indentations. This slit opens when the bird's head is towards the ground or in its natural position, and it shuts when raised. It is on account of this anatomical disposition that fowls when they drink are obliged to raise their heads. The neck is composed of vertebrae of great flexibility. The trunk, on the contrary, is little movable; the dorsal parts, lumbar and sacral, of the spinal column, form an axis nearly inflexible, on which is articulated a basin entirely immovable, and a thoracic cage formed by ribs, of which the vertebral portion and the sternal portion are equally bony, and articulate themselves toward the middle part of the flank.

The sternum or breast bone is a large bony shield, capable of giving a large insertion to the motive power of the wing; that surface is, moreover, enlarged by a projecting blade, which has received the name of *brechet*, and is prominent on the whole of the median line of the sternum. The *brechet* is more or less developed, according to the power of flight of the bird. Birds that have short wings have no *brechet* at all, whereas in birds of prey it is very developed, and also hooked. With certain species of birds it is even hollow and replaced by an air-bag.

The anterior member is conformed in the wing, and for that purpose the shoulder is strengthened by a double cavicated apparatus, the merry-thought and sidesmean, which rest on the sternum, or breast bone. The dimensions of the merry-thought vary in birds according to the degree of de-

velopment of the wings, and it is missing in birds with short wings.

The *humcrus* or bone of the arm, the *radius* and *ulna*, or forearm, offer nothing remarkable, but the end of the wing, or the hand, is formed like a stump, in which can be distinguished a thumb and a finger, more or less rudimental with two bone-joints. This mechanism, moved by powerful muscles, produces the basis of an instrument of locomotion really formed by the feathers. On their posterior border, the hand, forearm and arm bear the feathers of the wing, the force and dimensions of which are diminished as they get nearer the body.

The posterior, or abdominal member, is conformed for perching or walking. It is composed of a *femur*, or thigh bone; of a *tibia*, or leg bone; then, instead of the *tarsus* or *metatarsus*, comes a single bone, called bone of the *tarsus*, which represents these two parts, and gives internally attachment to the toes. These are four in number, three before and one behind, and some breeds have five. The knee is called the *patella*, and the heel *calcaneum*, or *os calcis*—heel-bone. The bone of the *tarsus* or *canon* represents the foot of the hen, but she does not set it on the ground, walking on the toes, which are extended so as to give her a better basis of support.

ORGANS OF NUTRITION.

There exists in the hen three pockets, or stomachic dilations. The first pocket is very visible to the eye when full of food, and is called the *crop*. A little further on in the breast is the *oesophagus*, which contracts and expands so as to form a second pocket, with thick and glandular walls, and which is called *ventricule succenturie*. Finally, next to the above is found a third cavity, very muscular and strong, known by the name of the *gizzard*.

The *crop* is the receptacle of grain swallowed by the fowl. It is in this first pocket that digestion takes place. The *oesophagus* takes root from the back of the beak, runs along the neck,

behind the trachea, and ends in the abdomen or belly, a little to the left. The work of the *gizzard* is to triturate the food which the hen cannot masticate. Small stones swallowed by the hen are found in the *gizzard*, which some naturalists say facilitate that operation. They state that the lining of the *gizzard* is formed of an extremely strong muscle, which contracts to nearly touching, so as to grind the grain between the stones. This *Perre de Roo* doubts, very pertinently saying that it is but an hypothesis which it would be impossible to prove.

Upon the process through which the food passes, M. *Perre de Roo* quotes from a distinguished French veterinary surgeon, M. *Mariot-Didieux*, as follows, supporting his opinion:

"After a further strangulation and a short passage, the food is sent into the third pocket or *gizzard*. This last stomach is formed by a thick and very strong muscular membrane; the external fibres are of a sinewy nature, and of a nacreous (pearl) color; the internal membrane which lines the *gizzard* is very thin, fibrous and hard; it secretes a yellow coloring matter, which appears to have the property to dissolve stones, principally carbonate of lime. Silicate of potash (flint) requires a longer process. Liquids taken as drink appear to be absorbed by the first and second stomachs; they are never found in the *gizzard* unless in case of disease. It is worthy of remark that a hen eats, when in health, about three grammes (48 pennyweight, Troy) of calcareous or silicious sand a day. Most naturalists and writers on poultry have been unanimous in attributing this phenomenon to the necessity that all gallinaceous birds have to eat gravel and stones to facilitate their digestion; the stones, according to these writers, fulfil the office of masticating organs or triturators of food. Without absolutely denying this opinion, so generally admitted, we think the usefulness of the stones, considered as triturators, is but secondary, and that