

## **External and Internal Anatomy of the Rock Dove**

### A. External Anatomy

#### 1. Head

Note the upper and lower eyelids; also the nictitating membrane under the eyelid in the anterior corner of the eye.

Upper mandible. The culmen is the median ridge of the upper mandible running from the distal end of the nostril to the tip of the bill.

Lower mandible. The gonys is the median ridge of the lower mandible.

Identify the nostrils and the soft, swollen operculum behind the nares (external).

#### 2. Wings

Identify the manus, antebrachium, and brachium. Locate the wrist and elbow of the wing. Note the fold of skin between the brachium and antebrachium.

This is the patagium. There is a second fold between the brachium and the trunk. This is the humeral patagium.

#### 3. Legs

Thigh – the proximal segment, containing the femur.

Crus – the second segment containing the tibiotarsus and fibula.

Knee – junction of the thigh and crus.

## Foot

Tarsus – the third segment, containing the tarsometatarsus.

Digits – only four, digit five has been lost from the basic vertebrate set of five.

Heel – junction of the crus and foot.

## B. Internal Anatomy

1. Open the left side of the mouth by cutting the angle of the jaws and continuing the incision through the body wall down the side of the neck.
  - The mouth is the cavity between the upper and lower mandibles. The mouth is roofed by the palate. Note the median slit in the palate, the choana (internal nares). A cleft palate is characteristic of birds.
  - Dorsal to the palate is the nasal cavity. It is confluent with the outside by way of the external nares.
  - In the floor of the mouth is the tongue. It is attached by only a small part of its under surface. If you dissect away the covering of the tongue you will find the median bone of the hyoid apparatus, follow the horns of the hyoid as they extend toward the angle of the jaws.
  - The pharynx is the posterior continuation of the mouth, beginning at the posterior end of the choana. Just posterior to the choana is a small slit-like opening common to the two internal auditory canals. On the floor of the pharynx is the laryngeal prominence with an elongated

opening the glottis, which leads into the trachea. There is no epiglottis in birds.

- Dissect away the skin from the right side of the head. Note how the skin tucks into the external auditory meatus. Identify the protractors of the mandible (depressor mandibulae) and the adductors of the mandible (masseter and temporalis) which pass mesiad to the zygomatic arch.
2. Carefully open up the neck incision further and identify the esophagus, which connects the pharynx to the stomach and the trachea, which connects the pharynx to the bronchi. Note the tracheal rings. Trace the esophagus posteriorly and find a bi-lobed diverticulum, the crop. Separate the crop posteriorly from the pectoral musculature by removing the connective tissue and fat.
  3. Continue the neck incision through the skin and down the mid-ventral line from the furcular depression between the clavicles to just anterior of the cloacal opening.
    - Note the large superficial muscle, the pectoralis. Determine the origin and insertion. Cut the pectoralis at the origin along the keel of the sternum and note the smaller muscle lying beneath (dorsally). This is the supracoracoideus. Note its origin. Follow this muscle anteriorly and dorsally through the foramen triosseum to its insertion on the dorsal surface of the humerus.

4. Cut through the supracoracoideus, clavicle and sternum and into the body cavity. Be careful not to injure the organs lying immediately below.

Continue opening the body cavity posteriorly to the cloacal aperture. The many mesentery-like membranes are the walls of the various air sacs that fill the body cavity.

- Median and most ventral in the thoracic region is the very large heart. It is surrounded by a membrane the pericardium. Like in mammals the heart is four chambered; left and right atria and left and right ventricles.
- Using the attached figure identify the blood vessels that lie close to the heart. Note in particular that the aortic arch which rises from the left ventricle and leads to the dorsal aorta is on the right side of the body.
- Identify the two innominate (brachiocephalic) arteries, the subclavian and common carotid arising from them, and the axillary-brachial artery as a continuation of the subclavian artery through the axillary region into the wing. Note the large pectoral artery that branches off the axillary artery just before it leaves the body cavity.
- Anterior to the point at which the common carotid artery arises from the brachiocephalic you should find the little oval thyroid gland lying ventral to the carotid. The jugular vein is just lateral to the common carotid at this point.
- Identify the pulmonary artery that leaves the right ventricle in a leftward direction dorsal to the aortic arch.

- Blood is returned to the right atrium by the two precavae from the anterior part of the body. Each precava receive receives a jugular vein brachial vein and a large pectoral vein.
  - Blood also enters the right atrium through the single postcava from the posterior part of the body.
  - Blood is returned from the lungs to the left atrium by the short pulmonary veins, which you cannot readily discern without tearing them up – so don't!
5. Trace the trachea posteriorly to the left of the heart in order to locate the point where the trachea bifurcates into the left and right bronchi, each of which communicates directly to the left and right lungs. Note the dorsal position of the lungs, tight against the ribs.
- At this bifurcation of the bronchi is the syrinx. Note the external and internal typaniform membranes.
  - Notice the body cavity, the coelm, is lined with a thin membrane, the peritoneum, which is continuous with the mesenteries that support the various organs within the body cavity.
  - The liver is the dark organ in the anterior end of the abdominal cavity. Rock Doves like most birds have no gall bladder.
  - The stomach is located on the left side of the abdominal cavity. It is composed of two portions, a soft glandular anterior portion that is continuous with the esophagus, the proventriculus; and a hard

muscular portion, the gizzard (ventriculus) with its large lateral muscles. Open the gizzard and note the koilin lining.

- With the aid of the attached figure, trace the small intestine as it continues from the gizzard. Its initial loop is the duodenum. This loop encircles the thin pancreas, which empties into the duodenum by three ducts. Two bile ducts from the liver also enter the duodenum. The spleen can be found between the duodenum and the proventriculus. The remaining sections of the small intestine are indistinguishable from one another (jejunum and the ileum).
- At the junction of the small intestine with the very short large intestine are two lateral pouches the ceca (singular – cecum).
- The terminal end of the large intestine is joined by ducts from the kidneys and the gonads and is the cloaca.
- The two kidneys are posterior to the lungs and dorsal to the peritoneum, lying in a depression of the pelvis. They are tri-lobed. From the medial border of each kidney, the metanephric duct (ureter) arises and passes directly to the cloaca. Birds have no urinary bladder; why?
- Females. Ventral to the kidneys and a little anterior and medial is the single left ovary. Most birds have just the left ovary, although hawks and owls generally have both. Identify the coiled oviduct which opens anteriorly into the coelomic cavity through the ostium. The oviduct continues posteriorly to the cloaca.

- Males. The testes are paired organs lying ventral and medial to the kidneys. They are asymmetrical in that the left one is usually larger than the right one. From the medial border the convoluted vas deferens passes from each testis to the cloaca. The expanded distal end of the vas deferens is the seminal vesicle in which sperm are stored prior to copulation.

6. Make an incision along the cloaca. It is divided internally into three parts:

- The copradaeum is continuous with the large intestine
- The middle part is the urodaeum. It is dorsal to the copradaeum and receives the metanephric duct and vas deferens or oviduct.
- The third portion, the proctodaeum, is the most posterior section. It opens to the outside through the vent or cloacal aperture.

7. Open up the skull dorsally and identify the cerebrum composed of two unfissured cerebral hemispheres, the medial cerebellum, and the large, ventrolateral optic lobes with the pair of optic nerves.