

**A Field Manual for Collection of Specimens
to Enhance Diagnosis of Animal Diseases**

2.2 HOW TO NECROPSY A BIRD

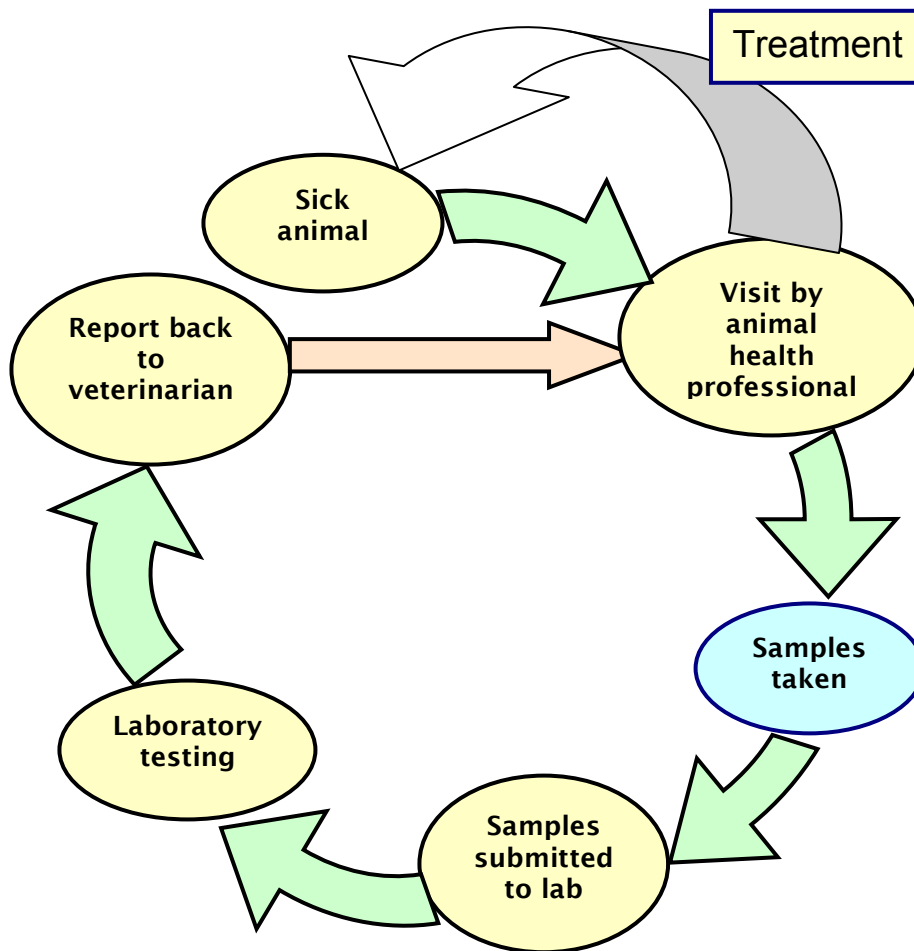
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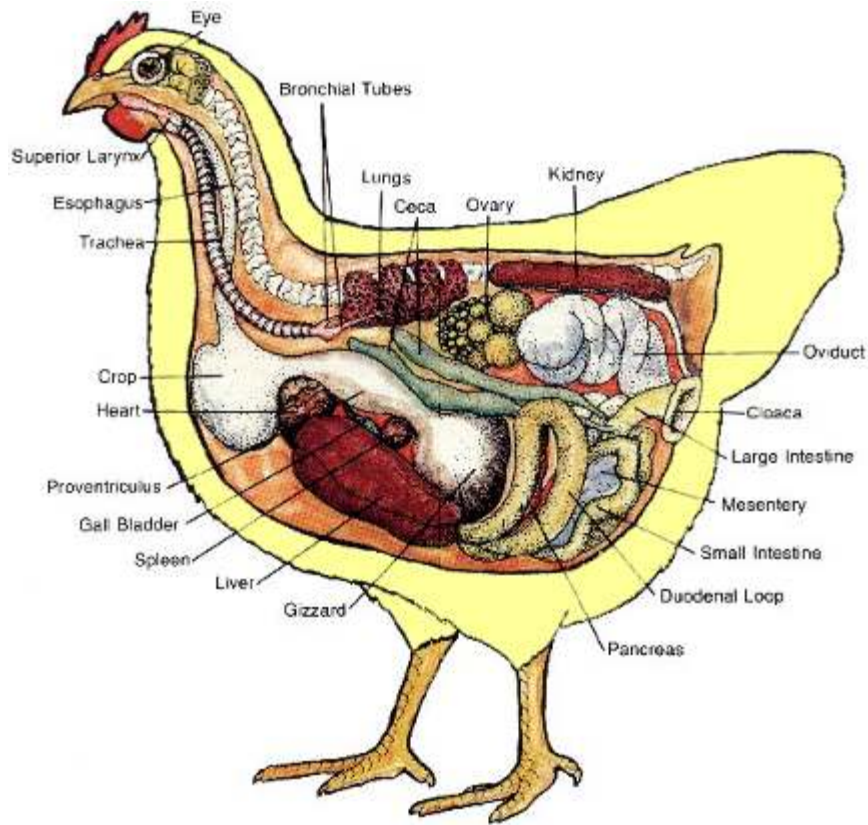
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TAKING SAMPLES

This chapter will focus on how to best collect the samples in the field, and so optimize the key element of sample collection, as seen in the circle diagram below:



2.2 HOW TO NECROPSY A BIRD



Recognizing and recording abnormalities are enhanced by developing a consistent routine in the dissection and collection of tissues. There is often a tendency to move quickly to the suspected lesion or body system, which risks missing important information. A good necropsy involves paying attention to ALL the clues that can be provided, so the routine has to be followed, with attention to detail at every step.

The consistent routine entails 6 steps:

1. Obtain the history
2. Examine the animal externally
3. Open the body
4. Remove the organs and set aside for detailed examination and sampling
5. Examine and sample the organs
6. Write the report

STEP 1. Obtain the history

A good individual animal and flock history should be obtained. This history should include:

1. Bird's age
2. Sex
3. Breed
4. Clinical signs
5. History of trauma or disease
6. History of any treatments administered
7. Any other information that may be relevant to the case such as type of feed and water
8. If the bird is a member of a flock the following is also required:
 - Number of birds in the flock
 - Number of birds in the affected group
 - Number of affected birds
 - Clinical signs of the flock should also be noted

A proper history can help in determining what samples should be taken and what tests are necessary for making the correct diagnosis.

STEP 2. Examine the bird externally

- Examine the bird for any signs of trauma and evaluate the bird's general body condition.
 - If possible the bird should be weighed.
 - The keel bone should be felt to determine if there is any pectoral muscle atrophy.



- The skin, feathers, eyes, ears and beak should be examined for any abnormalities. Take a close look at the comb and wattles - any swelling? Discoloration?
- Look at the back of the bird for evidence of feather picking.
- If any skin lesions are noted, they should be sampled.
- Examine all mucous membranes (mouth, nares, and conjunctiva) for any discoloration or other abnormalities. How about the cloaca? Any diarrheal staining? Urates present? Trauma?
- Look at the joints - any swelling?

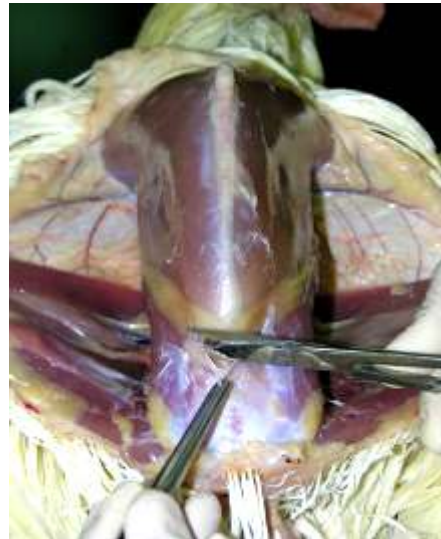
- Prior to opening the body, you might want to swab the trachea or cloaca. When swabbing the trachea, insert the swab up in the choana, as depicted in the photograph on the left below, prior to inserting in the trachea.

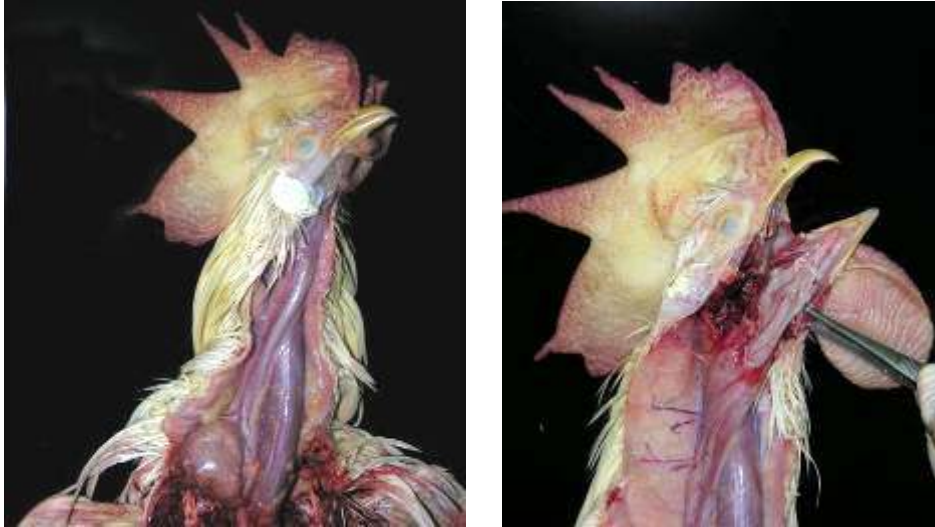


- Dip the whole carcass into a bucket of soapy water to thoroughly wet all the feathers - this will decrease the dander that might aerosolize from the skin and will also keep your instruments free of small feathers as you do the dissection.

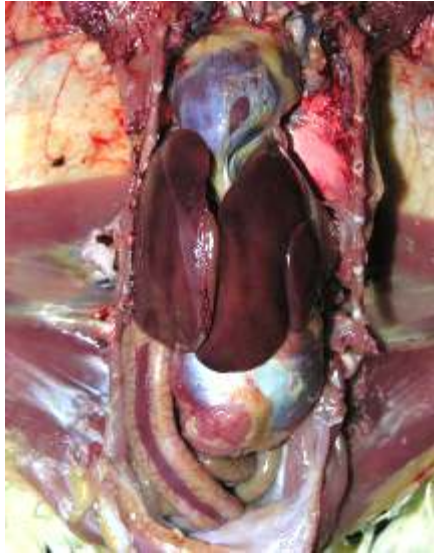
STEP 3. Open the body

- The body should be placed on its back with its feet facing you.
- Reflect the wings back.
- Cut through the skin between the legs and the breast so the legs can be fully abducted and lie flat against the table.
- Remove the skin from the ventral surface of the bird by cutting across at the caudal edge of the keel and then pulling skin cranially and caudally - peel away from the muscle to expose the muscular body wall.
- Make a small cut into the body cavity using scissors or a scalpel blade - just behind the breast bone, and then pull the abdominal muscle caudally to expose some abdominal viscera.
- Extend the cut up through the cervical area and cut open the beak at the angle of the jaw. Now oral cavity, esophagus, trachea and crop are all visible.





- The keel bone and breast muscles are then removed by incising the pectoral muscles on each side of the keel and cutting through the ribs. Use the heavy poultry shears. Remove the keel and breast muscles entirely - you should now be able to see the internal organs from oral cavity to rectum.



- At this point, all internal viscera should be examined in situ for any abnormalities before removing any organs. Note the color, position and size of all organs and look for any adhesions.



- Examine the air sacs for increased thickness or cloudiness (caudal thoracic air sac is at the end of the forceps).

STEP 4. Remove the organs and set aside for examination

It is probably easiest to remove the abdominal viscera first and then go back and remove the thoracic organs.

Remove the liver - in birds the liver takes up a big portion of the abdomen.

The **spleen** can be a difficult organ to find once everything is removed so it is a good idea to locate it now and set it aside. It is spherical in shape and located on the right side at the junction of the proventriculus and ventriculus. Pull the proventriculus aside and it should pop into view. Take it out now and set it in a clean dry spot.



Find the junction of the esophagus and stomach, cut here and pull the digestive tract out, all the way to the cloaca. The **digestive, urinary, and reproductive tracts** come together at the cloaca.

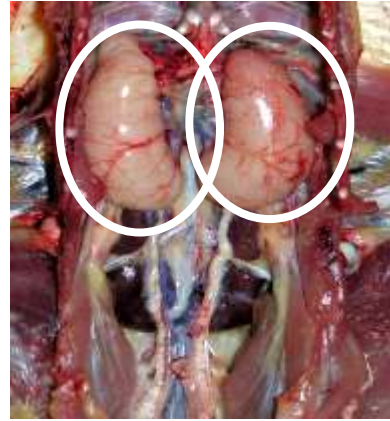
Located in the cloaca is the light cream-colored sacular organ, the **bursa of Fabricius**. The bursa of Fabricius contains lymphoid follicles and can be easily found in young birds. Once the bird reaches sexual maturity, it undergoes involution and therefore becomes smaller as the bird ages.

Cut at the end of the large intestine, but leave the bursa in the bird.

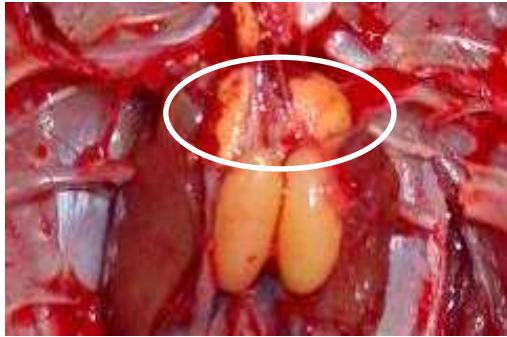
Here are two views of the bursa - undisturbed (left) and incised (right).



Kidneys are nestled up against the body wall - there are three portions - cranial, middle and caudal poles. The reproductive tract lies on top of and at the cranial end of the kidneys. See photos – top photos below are from a male, (left immature; right mature); lower photos are an immature female (left) and a mature female (right). In females only the left side of the tract persists, the right is vestigial and too small to be identifiable.

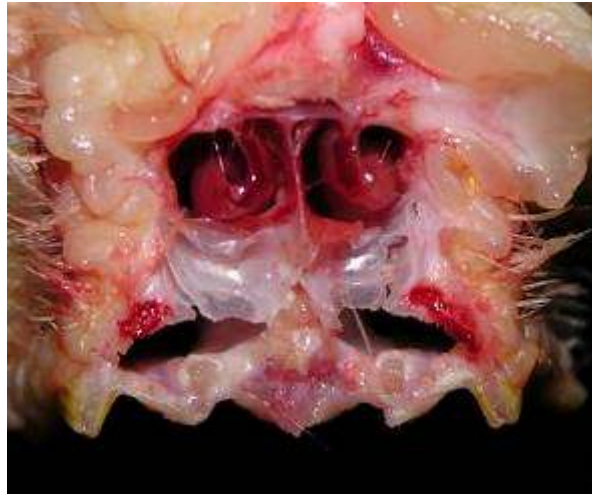


Adrenal glands are often difficult to find. Here they are lying just cranial to the testes in an immature male.

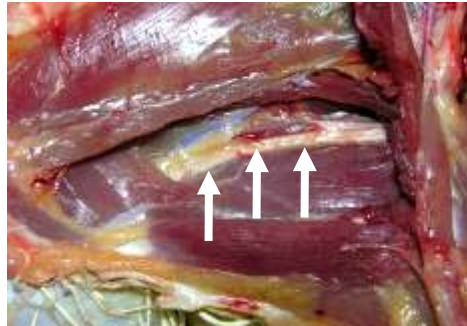


Pull the heart and lungs away - the lungs are closely adhered to the dorsal body wall, and therefore, careful teasing of the lungs away from the ribs may be necessary to remove them.

Open up the nasal cavity to take a close look at the **sinuses**.



Observe the sciatic nerve which is an important location where Marek's disease can be seen.



Open some joints to observe the fluid and synovial membranes.



The brain can now be removed. Using the smaller scissors (not poultry shears), chip away at the skull, beginning from the foramen magnum, and remove the calvarium covering the cerebral hemispheres and the cerebellum. Take the brain out - use care, this organ is quite soft.



STEP 5. Examine and sample the organs



It is a good idea to go from the “cleanest” organs to the “dirtiest”. Usually this order is: lymphoid tissue, brain, lungs, heart, kidneys, reproductive tract, liver, intestinal tract.

Note any abnormalities for each (color, consistency, distribution, and size). Be sure to examine both capsular and cut surface. Make several cuts in each organ. Collect specimens for further diagnostic work.

Lymphoid system

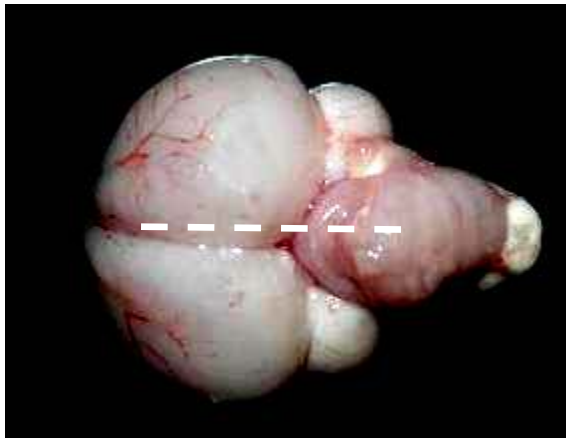
The spleen in birds is a small round organ that should be a uniform mahogany color on capsular and cut surfaces.



The bursa changes dramatically with age. Birds older than 10 weeks will have a bursa that may even be difficult to locate. A normal bursa in a young bird has an accordion-like structure and is a homogeneous tan color.

Brain

Often the brain is sliced down the middle to create symmetrical halves for frozen and formalin specimens.



Heart

The **heart** can now be examined. Make one incision into each ventricle, and examine muscles and valves.



Respiratory system

Begin by cutting through the larynx, trachea, and syrinx making note of any mucus, froth, or petechiae. Lungs should be pink, “spongy”, and free of any fluid.



Kidneys

These should be smooth and homogeneous. A reticular pattern is an indication of dehydration.



Reproductive tract

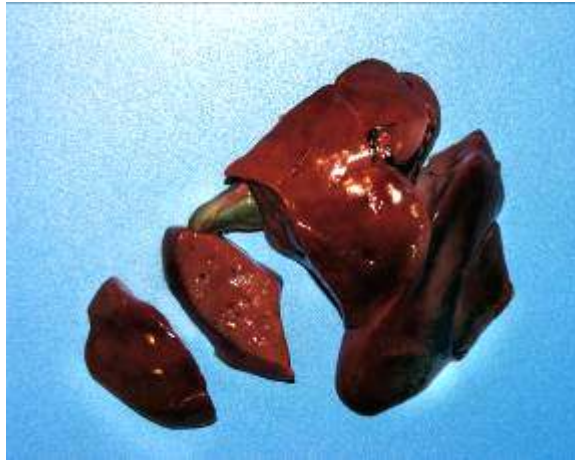


Testes are homogeneous on capsular and cut surfaces.

Ovaries should be free of inflammation. Sterile egg yolk peritonitis is a common finding in “spent” layers.

Liver

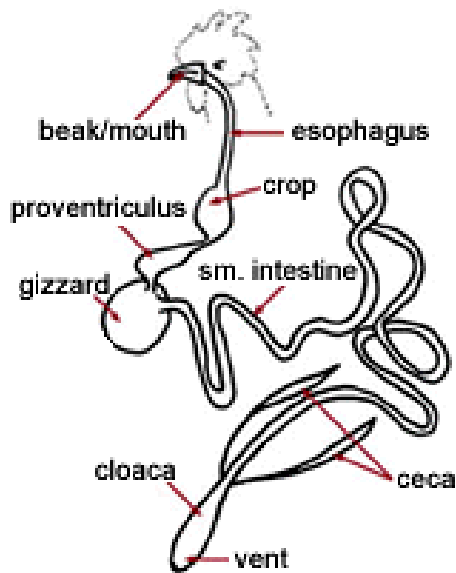
The liver's surface should be examined for any abnormalities. It should be palpated for any nodules, friable areas, or other abnormal changes. Several slices are made into the liver in order to examine the deeper structure of the liver.



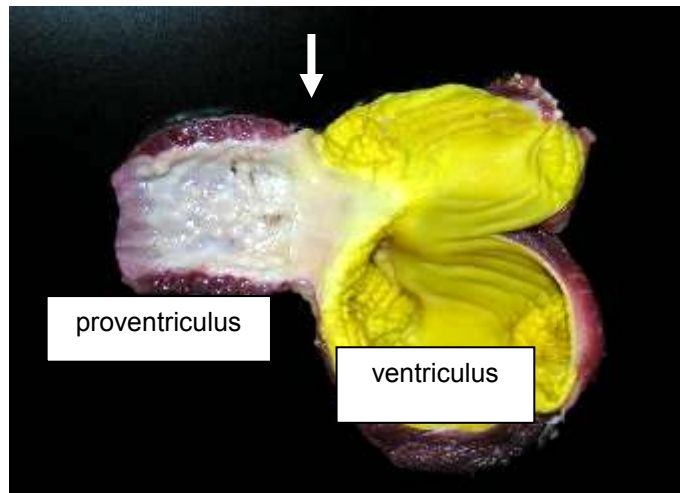
Intestinal tract

Look in the mouth for any abnormalities. Cut down the esophagus and see how much food is in the crop.





Open the **proventriculus** and make note of the lining which is normally bumpy due to the presence of digestive glands. Note any abnormalities.





The ventriculus, or **gizzard**, should be examined next. Because the **gizzard** is responsible for grinding ingested material, it has a thick external muscularis layer and contains small stones or grit. The ventricular glands secrete a thick protective gel, known as koilin, which has a yellowish color. The gizzard thickness should be examined and the surface examined for erosions, ulcerations, discoloration, or other abnormalities. Peel the koilin back to look at the mucosa.

Proventriculus-ventriculus The junction (arrow in photo, previous page) is an area with abundant lymphoid tissue and should be examined carefully for lesions.



The **small intestine** of birds is typically arranged into several loops before entering the colon. The first loop is the **duodenum**. It is easily identified by the location of the **pancreas** within the duodenal loop mesentery.

The remaining loops make up the **jejunum and ileum**. The **colon** is relatively short with two long **ceca** and connects to the **cloaca** via the **colorectum**.



In this picture you see the two ceca and the large colon in between. There are large lymphoid patches in the proximal portions of the ceca.

Sampling of organs –

- Tissues should be collected in duplicate, with half going into 10% formalin for histopathology and half as unfixed tissues that will be used for bacterial culture, virus isolation, fluorescent antibody testing, toxicology, etc.

- The following tissues should be collected in all cases: lung, liver, spleen, bursa, brain, kidney, intestines. Additionally, any other tissue that might have lesions (skin, adrenal, ovary, etc.) should also be collected.



- Label the tissues that are collected fresh so that the technician performing the tests can determine what each tissue is.
- Crushing should be avoided when taking samples since this may cause histologic artifacts. This can be avoided by using a sharp blade and a hard surface.
- When examining any organ with a mucosal surface (trachea, esophagus, intestine, etc.) care should be taken not to damage or destroy the mucosal surface by rubbing the surface with fingers or instruments.

- In order to improve fixation of tissues, samples should not exceed 5mm in thickness and volume of fixative should be at least 10 times the volume of tissue.
- Fresh samples should be packaged so that they remain cool and to minimize possibilities of leaking. Be sure to submit the proper paperwork to accompany the samples.

STEP 6. Write the report

No necropsy is complete until all findings have been recorded in written form. The report should include at least the following information:

- **Species, breed, age, sex**
- **History**
- **Died or euthanized?**
- **Nutritional, hydration status**
- **Findings from external examination**
- **Findings by organ system: Lymphoid (spleen, bursa), Respiratory, Digestive, Urogenital, Musculoskeletal, Nervous**

See NEXT PAGE for sample Necropsy Report Form.

Necropsy Report	
Date:	Necropsy done by:
Signalment (species, breed, sex, age):	
Degree of autolysis:	
History:	
External appearance:	
Appearance of body cavities:	
Digestive System:	
Respiratory System:	
Cardiovascular System:	
Immune organs (spleen, lymph nodes, bursa if avian):	
Urinary tract:	
Reproductive tract:	
Nervous System:	
Muscles, bones, joints:	
Other findings:	
Morphologic diagnoses:	
Diagnostic rule-outs:	

...END OF THIS SECTION...

