

**GROSS
NECROPSY
TECHNIQUE
FOR
ANIMALS**

King
Dodd
Newson

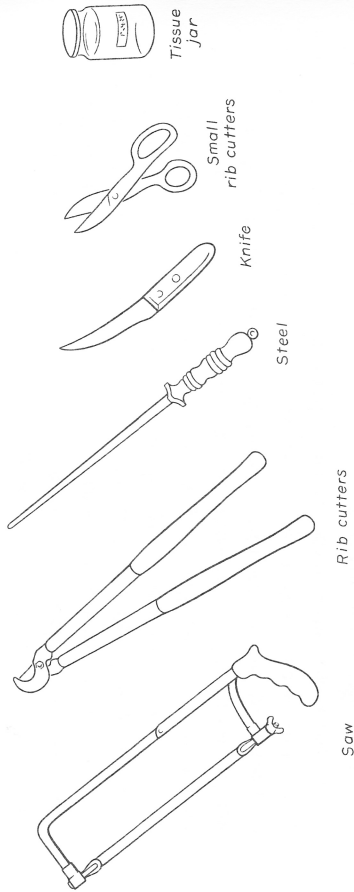
Introduction

A method for doing a necropsy (an autopsy done on an animal) using the horse as a model is described. Since the use of the horse may be questioned we could merely reply that we had to use an animal and the horse at least is ubiquitous. Another reason not usually expressed is that the horse not only has a single stomach as does the pig, dog and cat, but also has large fermentation chambers equivalent in function to the rumen of the ox and sheep.

The actual procedure of doing the necropsy is one of many used by veterinary pathologists and its practicality and adaptability have been demonstrated. We make no claim for the superiority of this method over others, but from considerable experience with it we know it can be used with facility on all species under consideration; by adhering to it no organ will be, and no lesion should be overlooked. No special equipment or instruments are required. Any phase of the procedure can easily be modified to suit the prosector's special needs or interests. We stress, however, that after having acquired facility and speed with one procedure, it is unwise to change it capriciously; a different method usually takes more time and may cause one to forget a necessary part of the procedure. A change in technique may also preclude instant recognition of an absent or displaced organ or otherwise familiar abnormality. For instance, the pylorus and first part of the duodenum are always close to view when the abdomen is opened by this technique and, if not directly in view one should immediately consider a twist or displacement of the stomach. The first kidney observed is the right kidney and if it's the only one with the cranial pole infarct this can be remembered more easily if one necropsies all animals with the animal's right side up.

GROSS PATHOLOGY AND NECROPSY TECHNIQUES

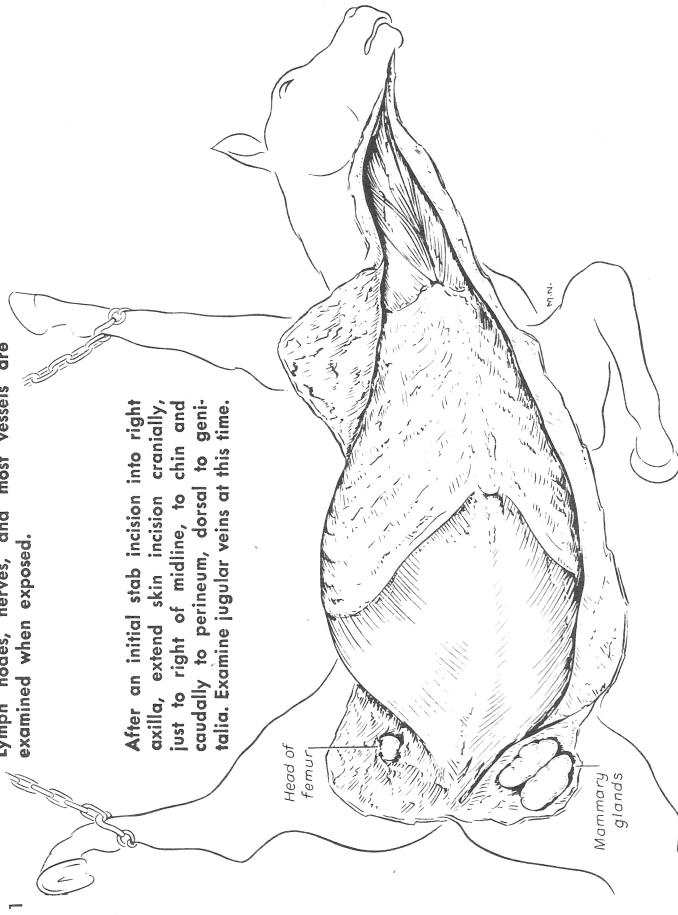
All animals are placed on their left side with the dissector facing the animal's abdomen. As this technique is demonstrated with a normal animal it is expected that common sense variations will have to be used when one encounters abnormalities (lesions) or various physiological states such as pregnancy. Although the horse is the model in this text, the major procedures are applicable to most species. Variations in techniques are noted where necessary.



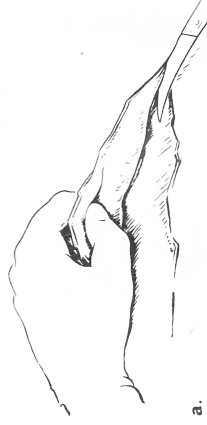
Wet the necropsy table surface to prevent adhesion of blood and other fluids. Read the history for indications of special techniques and care to be taken during the necropsy. Rubber gloves are required for all necropsies. Use at least ten times the volume of 10 per cent formalin to the volume of tissue taken for histopathology. Label the tissue bottle or other containers properly. Routinely take tissue samples of liver, kidney, lung and all lesions. Brain sections are indicated in a grossly negative necropsy. Sections should be no more than 1/4 inch (0.5 cm.) thick. As in any technique description, experience is needed to increase proficiency. Use of the carcass itself as a cutting board is recommended to prevent dulling the knife. To prevent cutting hair and thereby dulling the knife, the one stab wound into the axilla is the only time the knife cuts hair as the skin is reflected by cutting the subcutaneous tissue with the back of the blade towards the carcass.

Lymph nodes, nerves, and most vessels are examined when exposed.

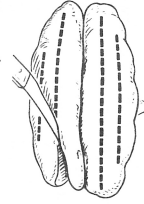
After an initial stab incision into right axilla, extend skin incision cranially, just to right of midline, to chin and caudally to perineum, dorsal to genitalia. Examine jugular veins at this time.



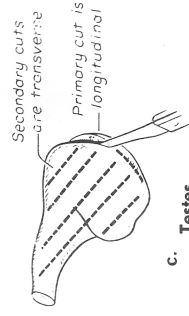
Reflect skin on right side and completely abduct right limbs by cutting muscular attachments of scapula and freeing femoral head. Reflect mammae or free each testicle separately. Cut open sheath. Cut back skin for short distance to left of midline.

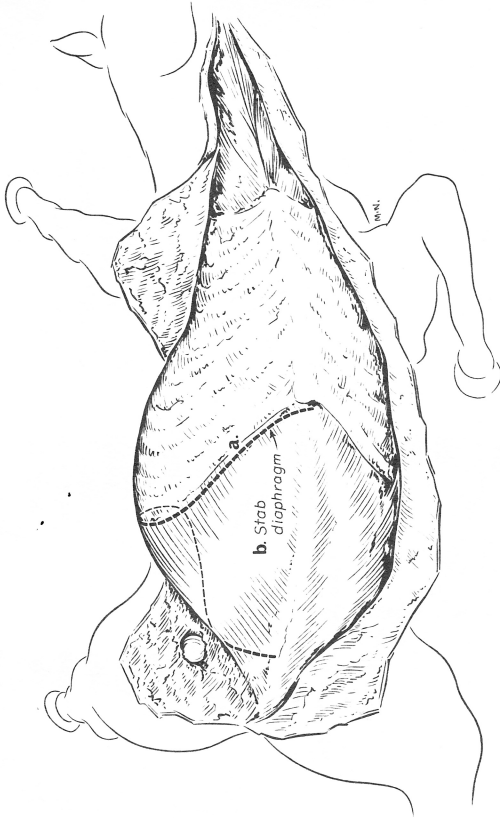


When cutting back skin, use belly of knife towards skin, back of knife to body.



Incise all sections of mammae to teat canals.



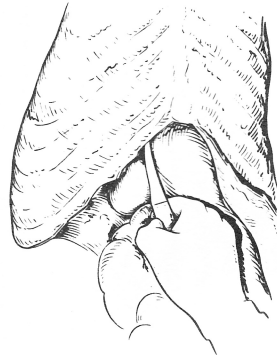


Incise along costal arch and dorsal flank down and across pelvic rim. Reflect this flap and examine abdominal cavity and viscera.



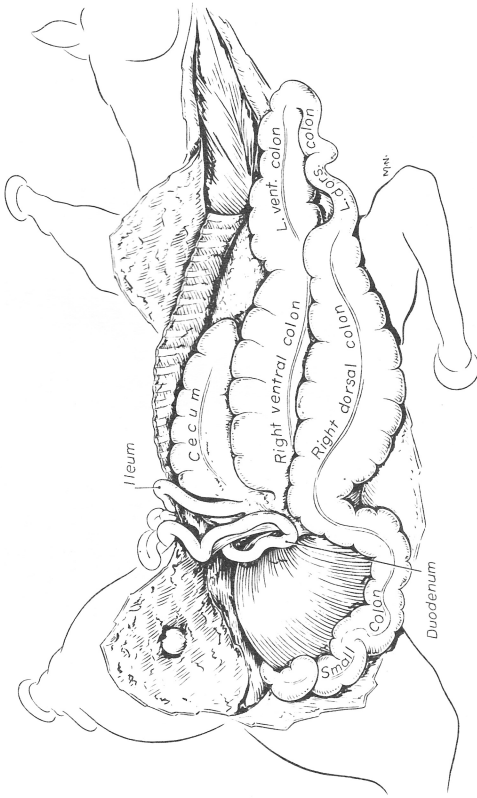
a.

Use belly of knife. Pull up abdominal wall to prevent cutting viscera.

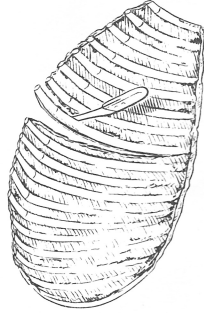


b.

Stab diaphragm near sternum and note inrush or absence thereof of air as lungs collapse. Cut entire right side of diaphragm along costal arch and observe thoracic cavity.

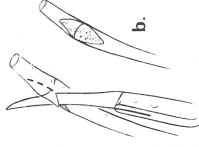


Remove ribs by cutting with rib cutters or saw, first close to sternum, then several inches from vertebrae. Check presence and position of all organs. Arrange G.I. tract to display all parts. In the horse place cecum dorsocranially, small colon on left thigh, large colon cranially, and small intestine over right flank. In cattle and sheep place small intestine and colon over right lumbar area, leaving forestomachs and abomasum in place. Examine but leave pancreas attached to duodenum or root of mesentery.



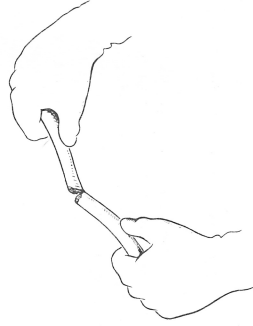
a.

Free a central rib by cutting off adjacent soft tissue close to bone.



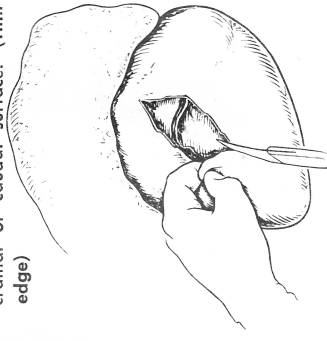
b.

Check costochondral junction of young animals by cutting along cranial or caudal surface. (Thin edge)



c.

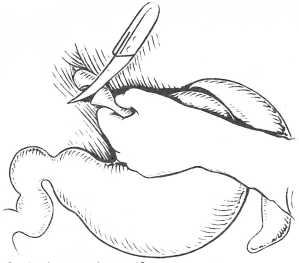
Break or attempt to break rib against curvature for test of general bone strength.



d.

In situ open pericardium and examine pericardial contents.

Intestines can be easily stripped out without cutting in some species (dog, cat, sheep) but cut mesenteric attachments close to the bowel in others. Free the remaining G.I. tract from the dorsal body attachments by careful, blunt dissection and some cutting (bile duct, ligaments, etc.). In ruminants, grasp dorsal caudal blind sac of rumen and pull forestomachs free of body towards the prosector.



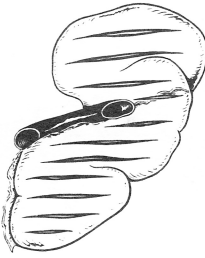
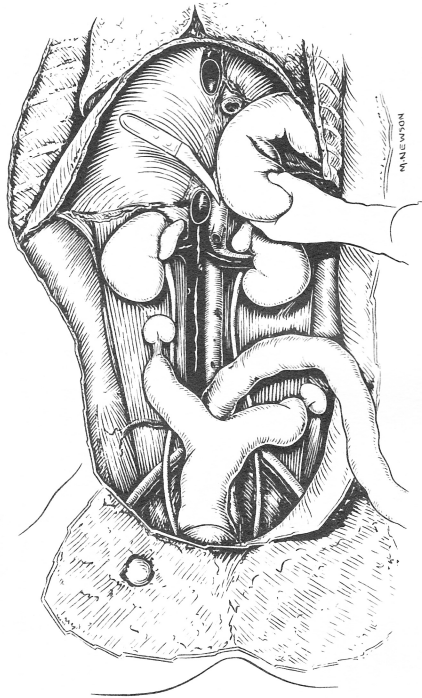
b.

Remove stomach by pinching off cardia and transecting esophagus. Spleen comes out with stomach. Detach spleen.



c.

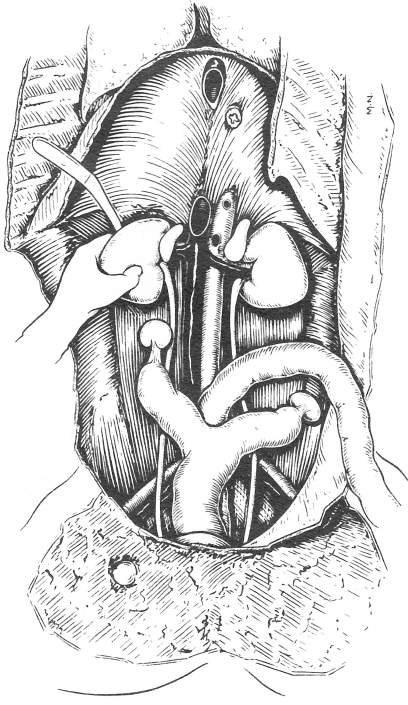
Make several inspection slices into spleen.



d.

Remove liver leaving diaphragm in place. Incise and inspect gall bladder in appropriate species. Make multiple inspection slices into liver and incise major vessels.

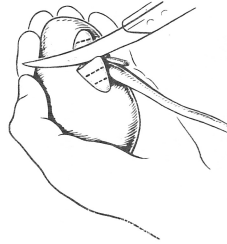
Remember: All sections for fixing should not be more than 1/4" (0.5 cm.) thick. Caution: Do not scrape or squeeze sections to be taken for histological examination. Always take sections with sharp knife, never with a pair of scissors.



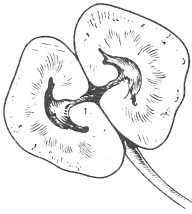
Remove kidneys separately leaving adrenals attached to kidneys. Leave ureter attached to kidney and bladder.

a. Do not hold adrenal itself. Incise adrenal.

Note cortex—medulla—cortex (CMC) ratio.

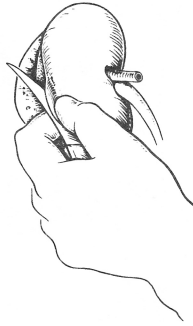


b. Cut each kidney longitudinally to the pelvis.



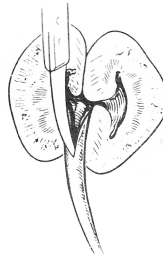
c.

Peel away capsule. Take tissue cross section to include cortex, medulla and pelvic epithelium. Make multiple transverse slices through organ.

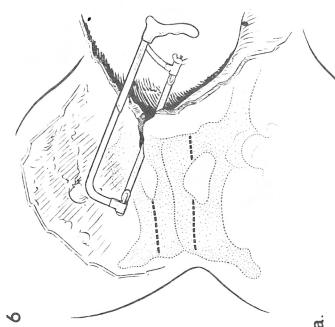


d.

Cut down ureter. Do not detach from bladder.

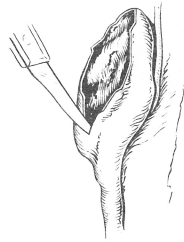


b. Cutting close to bone, remove pelvic viscera; kidneys with ureters and bladder, genitalia, and rectum.

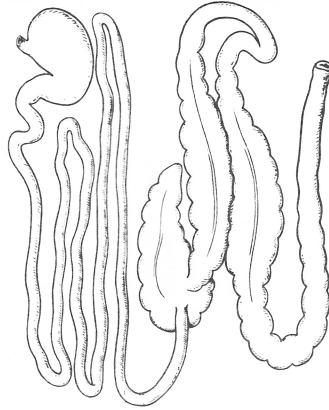


a. Open pelvis by sawing (or using rib cutters) through pubis to obturator foramen, then through ischium, both sides. Remove symphysis.

c. Open bladder and urethra.

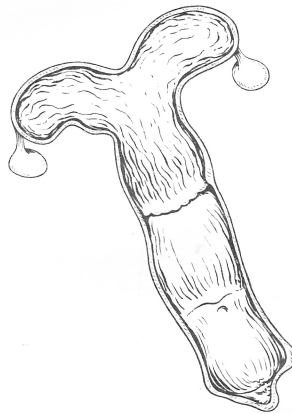


d. Cut ovaries longitudinally then transversely.

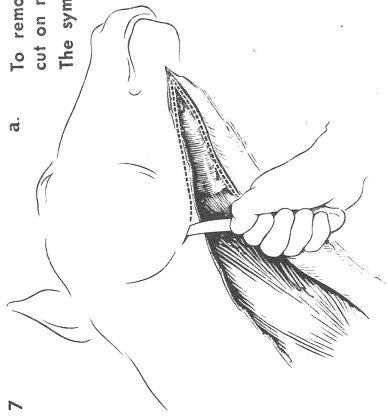


f. Lay G.I. tract in relative order to be opened as last major procedure of necropsy to prevent fecal contamination of tissues and instruments. (See Page 21)

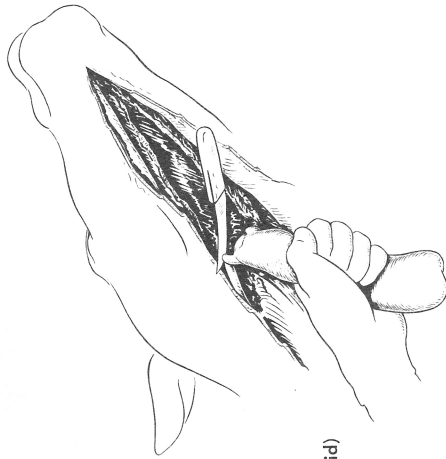
e. Open both horns of uterus, then cervix and vagina.



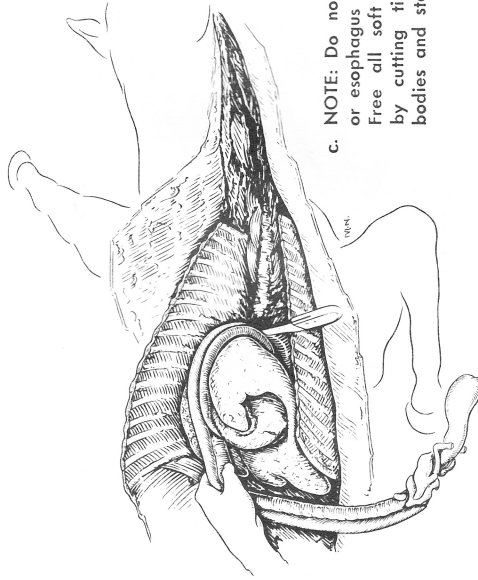
a. To remove tongue, cervical and thoracic viscera en masse, cut on medial side of both mandibles close to bone. The symphysis may be split if necessary for easier removal.



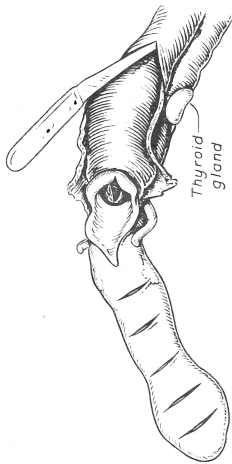
b. Free tongue manually (difficult in the horse). Pull tongue down and back. Cut through prominent (kerato-epithyoid) joint of hyoid bones on both sides.



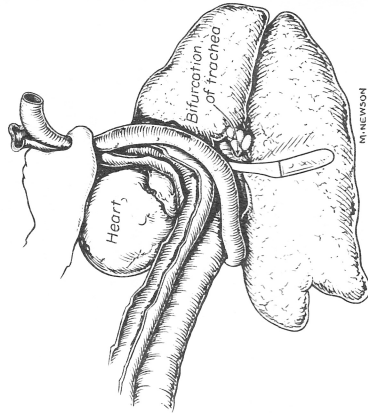
c. NOTE: Do not transect aorta, vena cava or esophagus except at diaphragm. Free all soft tissues back to diaphragm by cutting tissues adjacent to vertebral bodies and sternum.



- a Examine tongue by transverse sections. Observe and incise thyroids. Observe parathyroids. Cut down full length of esophagus.

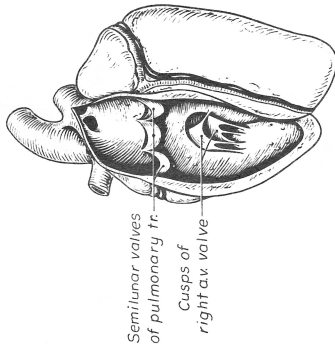
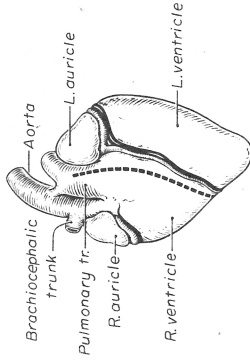
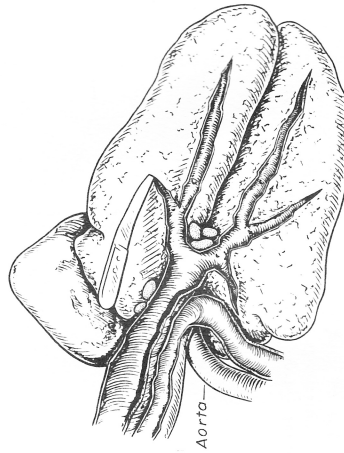


- b Free esophagus and aorta from dorsal caudal mediastinum to allow access to both bronchi.



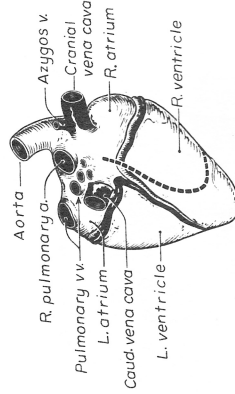
LEAVE HEART ATTACHED TO LUNGS.

- c Palpate lungs. Cut down trachea and major bronchi and observe cut ends of pulmonary arteries for emboli. Incise bronchial lymph nodes.

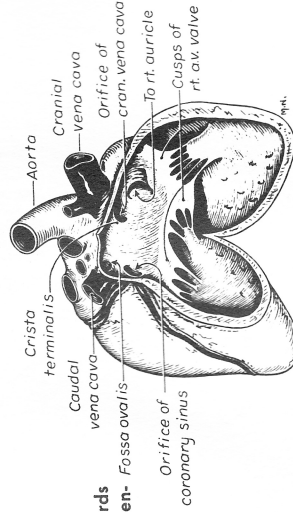


- a. To open right ventricle, hold heart in left hand with left side of heart towards you. Make incision, starting at pulmonary trunk, into right ventricle, close to interventricular septum.

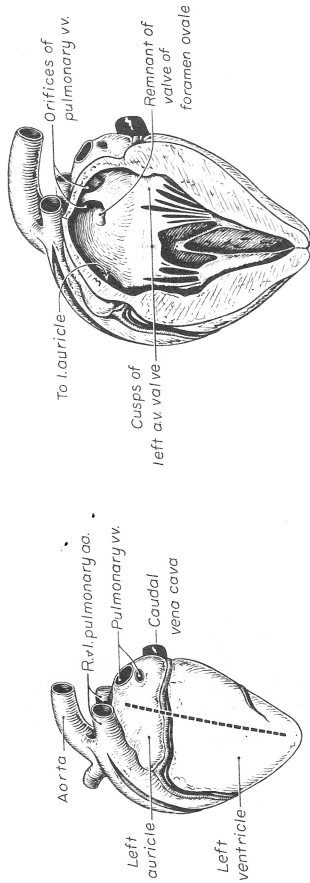
- b. Open pulmonary trunk post bifurcation. Check semilunar valves.



- c. Turn heart over with its right side towards you. Continue incision, following interventricular septum, into right atrium.

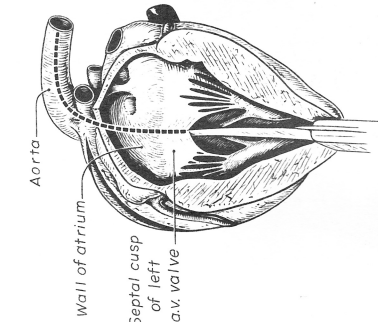


- d. Open right ventricle and atrium. Check right atrioventricular valve, orifices of cranial vena cava, caudal vena cava, fossa ovalis and coronary sinus.



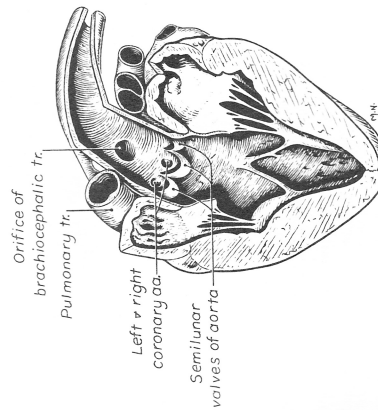
a. Open left atrium and ventricle with straight incision. Incise through parietal cusp of left atrioventricular valve.

b. Check left atrioventricular valve and openings to pulmonary veins.



c.

To open aorta, insert knife under septal cusp of left atrioventricular valve. Incise through wall of atrium, out and down aorta.



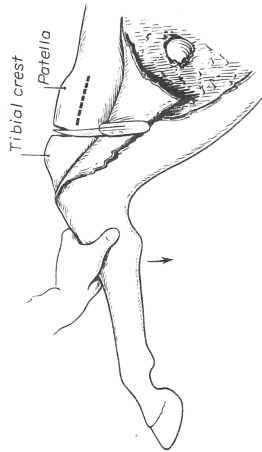
d.

Check semilunar valves of aorta, orifices of right and left coronary arteries, orifice of brachiocephalic trunk. Make multiple inspection slices through organ.

Open abdominal aorta and its major branches (mesenterics, iliacs, etc.).

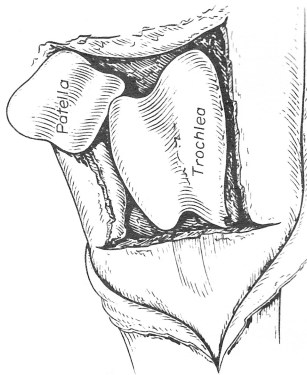
Five joints are routinely checked in the order given in the necropsy of most species. Six in young animals.

- Right hip
- Both stifles
- Right hock (and left in young animals)
- Right shoulder
- Atlanto-occipital

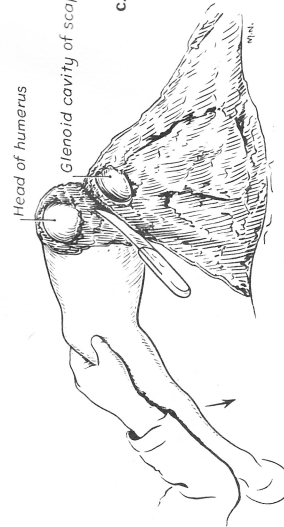


a. To expose stifle joint, reflect skin, bend joint and cut patellar ligament $\frac{1}{3}$ way up from tibial tuberosity.

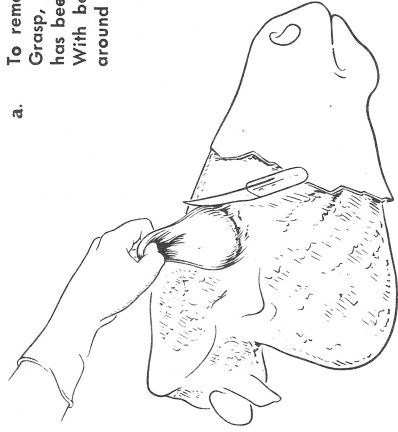
b. Incise along medial edge of trochlea. Reflect patella.



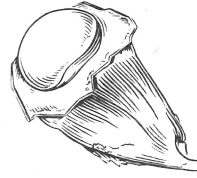
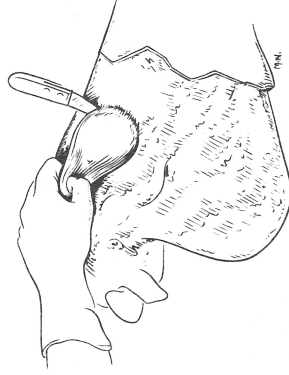
c. To expose shoulder joint, bend forelimb down to raise joint. Cut at highest point.



a. To remove eye:
Grasp, with minimum traction, the skin which has been left around eye.
With belly of knife, cut soft but tough tissues around orbit.



b. Cut deeply around orbit, staying close to bone. Transect optic nerve.

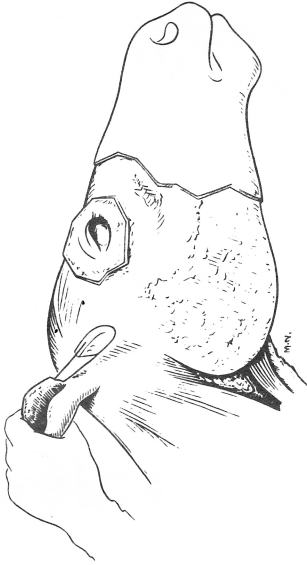


c. Remove eye.

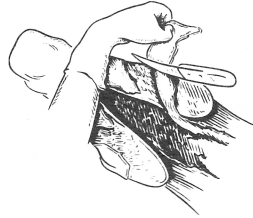
d. For proper fixation, remove excess tissue.



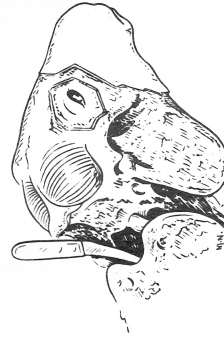
a. To expose atlanto-occipital joint and remove head, skin major portion of head and remove ears. Leave some skin around eyes.



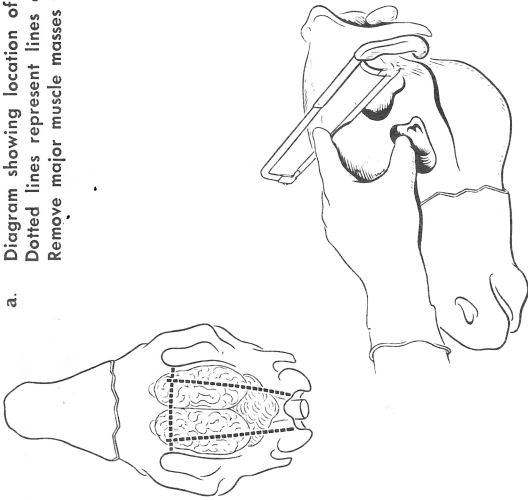
b. Prop head up (hoist, knee, or assistant) to skin left (down) side of head.



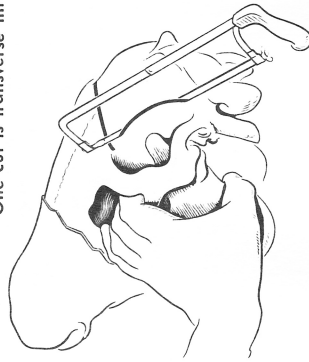
c. Move head to locate joint. Obtain CSF at this time if required. Cut all soft tissues around joint. Insert knife into foramen, transect spinal cord and ligaments of joint dorsally and ventrally. Do not direct knife into brain proper. Remove head.



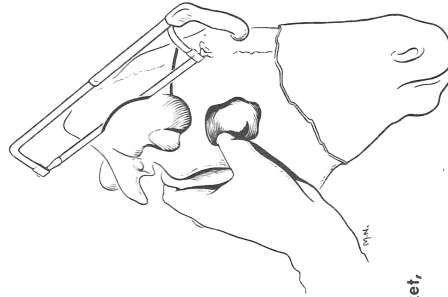
a. Diagram showing location of brain in dorsal view of skull. Dotted lines represent lines of incision. Remove major muscle masses from area of dotted lines.



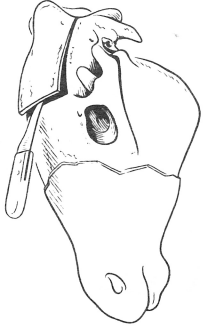
b. Hold head with thumb in eye socket, index finger on top of blade of saw. One cut is transverse through the frontal bone caudal to supraorbital process.



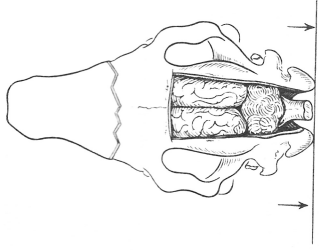
c. Place head on right side. Another cut is sagittal, just medial to left occipital condyle.



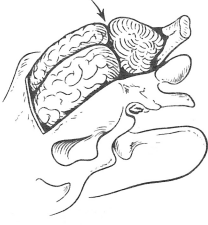
d. Place head on left side for one cut. Cranial part of head is toward you, thumb in eye socket, fingers around mandible.



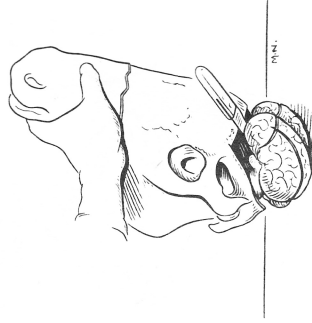
e. Pry up skull cap. Remove.



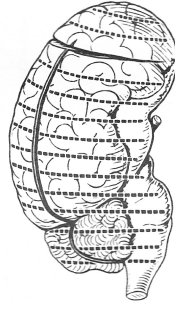
f. Check to see that tentorium cerebelli (arrow) is removed as well as other limiting dura.



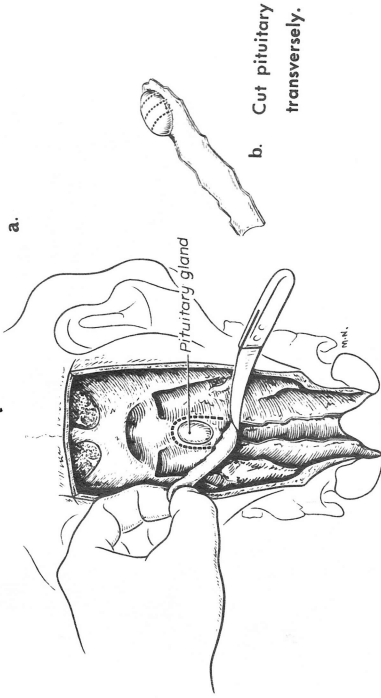
g. With head in upright position, tap it lightly on table to loosen brain.



h. Cut olfactory tracts and cranial nerves as brain is removed. Tilt head so that brain will rest on table.

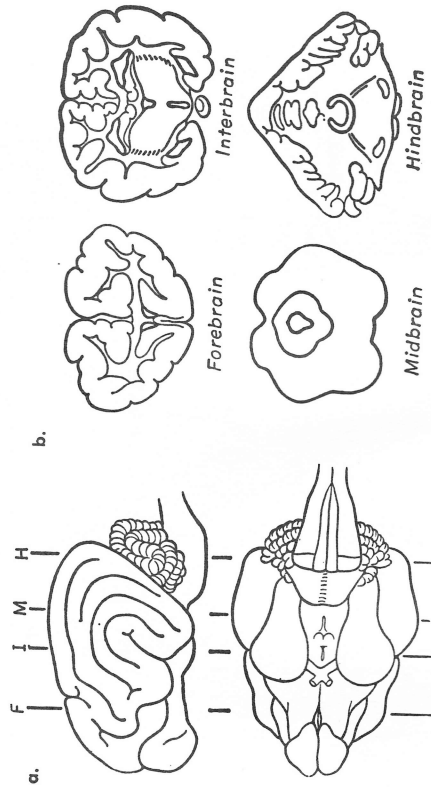


i. If brain is not to be kept, cut in 1 cm. transverse sections for inspection.



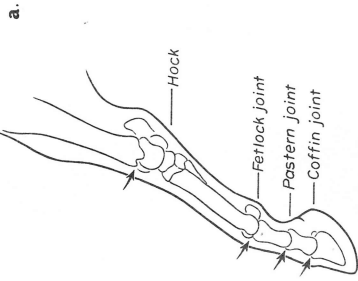
b. Cut pituitary transversely.

To remove pituitary: Pick up dura on basioccipital between condyles. Peel it forward to include pituitary.

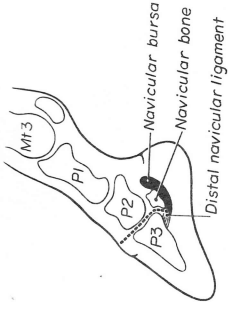


Cross section of brain most useful for histological study (dog brain model)

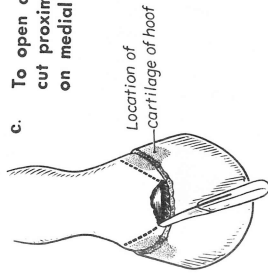
Prior to checking distal joints on the limb, skin the leg to include removal of coronary band.



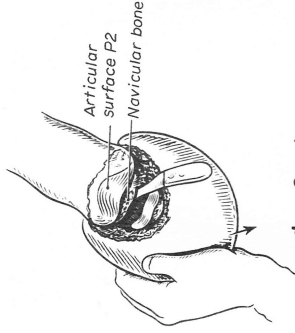
a. To check joints on hindlimb distal to stifle: For reasons of leverage start at the coffin joint, then pastern, fetlock and tibiotarsal articulation of the hock.



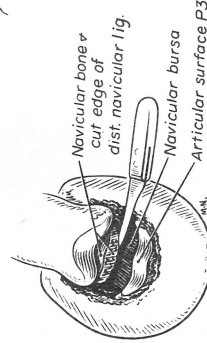
b. Diagram of section showing depth of incision at coffin joint.



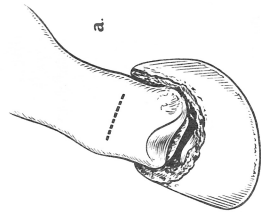
c. To open coffin joint and examine navicular bursa, cut proximal to wall of hoof, first across front then on medial and lateral sides, deep to cartilage of hoof.



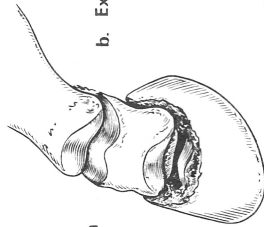
d. Cut deep to expose navicular bone and to cut distal navicular ligament.



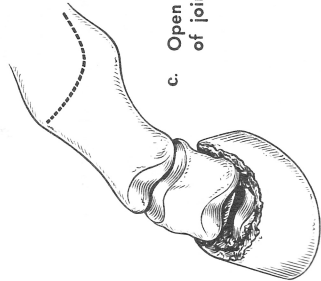
e. Raise navicular bone to expose navicular bursa.



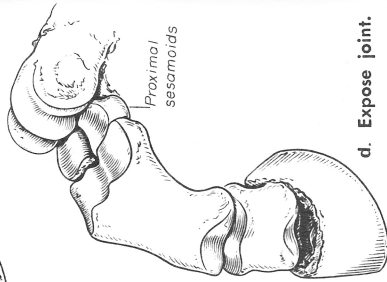
a. Open pastern joint with incision across front.



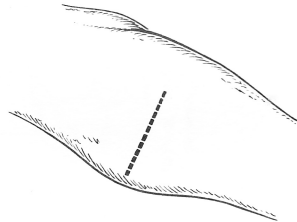
b. Expose joint.



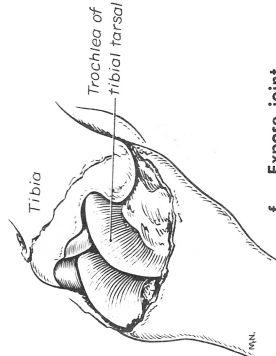
c. Open fetlock with incision across front of joint and up one side.



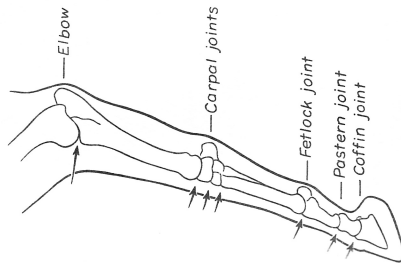
d. Expose joint.



e. To expose tibiotarsal articulation of hock, cut across front of joint at distal end of tibia.



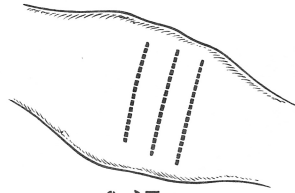
f. Expose joint.



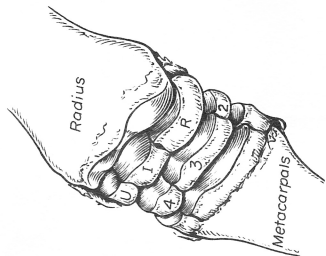
a. To check joints of forelimb distal to shoulder:

Skin the limb.

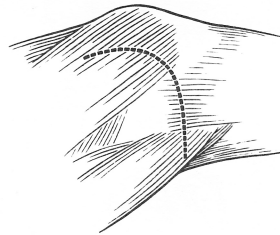
Again for necessary leverage, start at coffin joint. Procedures for opening the coffin, pastern and fetlock joints are the same as described for the hindlimb.



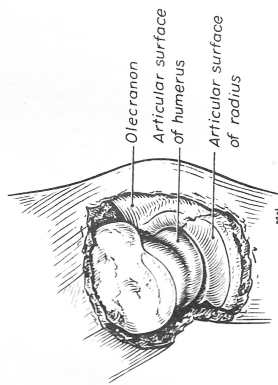
b. To open carpal joints make three incisions; at distal end of radius, between rows of carpal bones, and at proximal end of metacarpals.



c. Expose joint.

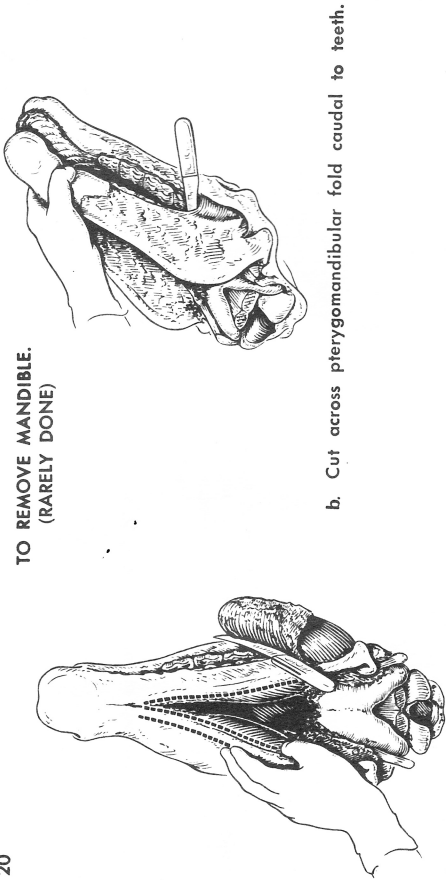


d. To open elbow joint, go in from the medial side, incise around distal end of humerus.



e. Expose joint.

**TO REMOVE MANDIBLE.
(RARELY DONE)**

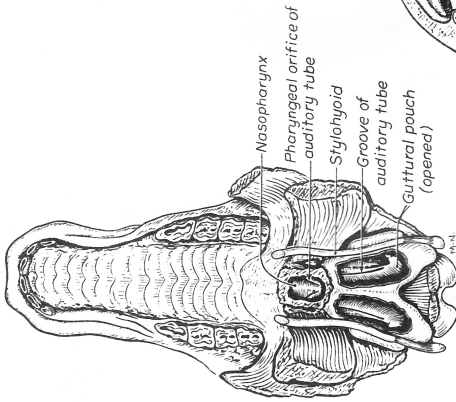


a. With dorsal surface of head on table, cut all muscles on medial and lateral sides of both mandibles from cranial or caudal (as shown) position.

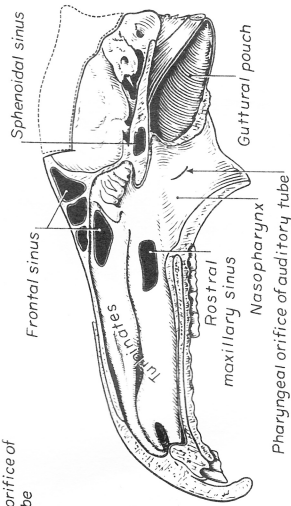
b. Cut across pterygomandibular fold caudal to teeth.



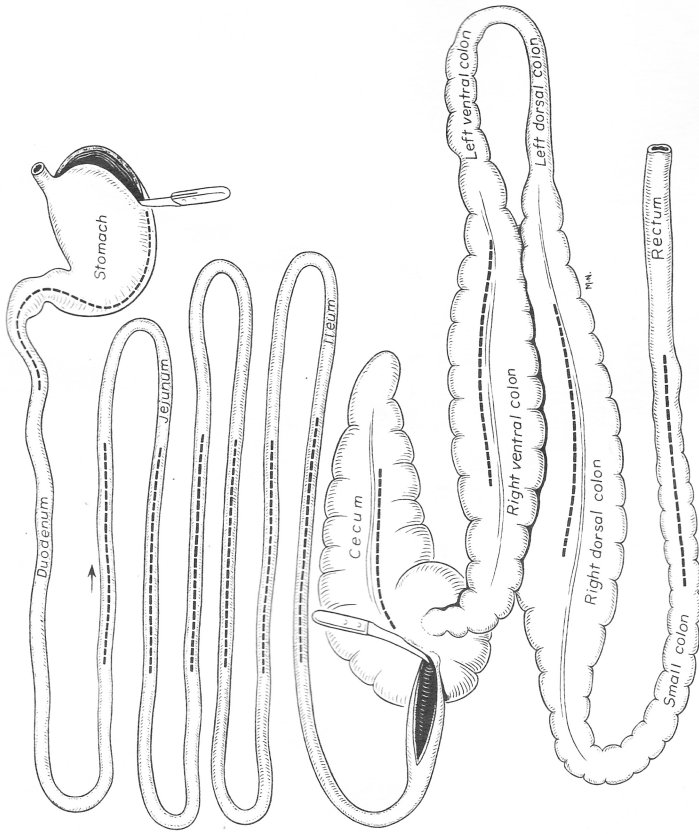
c. Pull back and free lower jaw.



d. Check guttural pouches.



e. Saw head in two sagittally. Avoid front teeth (hard on saw blade). Remove nasal septum to check sinuses. Another transverse saw cut cranial to the premolars will eliminate cutting any teeth.



To check G.I. tract, cut along greater curvature of stomach, forestomach, and representative lengths of duodenum, jejunum, and ileum. Open ileocecal orifice and cecum, large and small colon and rectum. Incise major vessels when exposed.

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