STANDARDIZED NECROPSY REPORT FOR GREAT APES AND OTHER PRIMATES
****this is a fillable form – if printing / hand writing please circle or highlight need information**

Pathology # Click to enter Necropsy Date Click to choose a date
Species Choose a species If other, then specify species Click to enter other species
Name Click to enter name ISIS/ID Click to enter ID SB#Click to enter SB#
Age/DOB Enter Age or DOB DOD Click to choose a date
Euthanized ☐Yes? ☐No? Post-mortem condition of carcass Choose an item.

Institution Click to enter Institution Name
Click to enter Street Address
Click to enter City, State Zip code
Contact Click to enter name Contact Email Click to enter email address
Prosector (if different from contact) Click to enter name and email

Abstract of clinical history:
Click here to enter text.

Gross Diagnoses:

Click here to enter diagnoses

External examination:

Measurements:

Body weight Click to enter (kg) Crown-rump length (sitting height) Click to enter (cm)

Chest circumference (level of nipples) Click to enter (cm)

Width across the back at level of axilla Click to enter (cm)

Abdominal circumference (level of umbilicus) Click to enter (cm)

Skin fold thickness at dorsum/ level of lower ribs Click to enter (cm)

Depth of abdominal fat Click to enter (cm) Depth of fat over throat sac Click to enter (cm)

If not examined, please enter "NE" in description. Sections of all tissues should be saved in formalin but not all tissues need to be saved frozen or photographed. See "Tissue collection guide" at the end of the worksheets for recommended frozen tissue collection. Please check whether tissues were saved in formalin, frozen and whether a gross photo was taken of lesions.

Site	Description	Formalin	Frozen	Photo
Eyes (fix whole- do not incise)	Ocular discharge?			
Ears				
Nose	Nasal discharge?			
Mammary gland (incl nipples)				
Skin/Hair				
Umbilicus (neonates only)				
External genitalia				
Scent glands				
Subcutis	(note fat, edema, hemorrhage, parasites)			

Head & Neck Region:

Site	Description	Formalin	Frozen	Photo
Oral Cavity (gingiva, lips, cheek)				
Dentition				
Larynx/ Pharynx				
Tongue				
Tonsils				
Laryngeal Air Sacs See appendix for air sac examination	Are they symmetrical yes☐ no☐? Are there septa yes☐ no☐?			
Salivary glands				
Thyroids Parathyroids	Combined weight Click to enter (g)			
Lymph Nodes (cervical)				
Esophagus				

Other Notes:

Thoracic Cavity:

Site	Description	Formalin	Frozen	Photo
Cavity	Note effusions/hemorrhage: volume Click to enter (ml) Pleural Adhesions yes☐ no☐? Mediastinal adipose yes☐ no☐?			
Thymus	Weight Click to enter (g) Size Click to enter x Click to enter x Click to enter (cm)			
Pericardium	Effusion yes☐ no☐? Volume Click to enter (ml) Pericardial fat yes☐ no☐?			
Great Vessels				
Heart * (See appendix for requested photographs and measurements)	Weight Click to enter (g) Circumference at groove Click to enter (cm)			*
Trachea/Bronchi				
Lungs	Weight: Left Click to enter (g) Right Click to enter (g)			
Lymph Nodes (tracheobronchial)				
Diaphragm				

Other Notes:

Abdominal Cavity:

For sections of gastrointestinal tract, remember to note contents

Site	Description	Formalin	Frozen	Photo
Cavity	Effusion yes☐ no☐? Volume Click to enter (ml) Adipose yes☐ no☐? Amount: Click to enter Adhesions yes☐ no☐? If yes, severity: Click to enter			
Liver	Weight Click to enter (g)			
Gall Bladder				
Stomach				
Duodenum				
Pancreas				
Jejunum				
Ileum				
Cecum/Appendix				
Colon				
Rectum				
Lymph nodes (mesenteric)				
Spleen				

Site	Description	Formalin	Frozen	Photo
Abdominal Aorta (open past bifurcation)				
Adrenals (weigh/measure L and R)	L Weight Click to enter (g) Size Click to enter x Click to enter x Click to enter (cm) R Weight Click to enter (g) Size Click to enter x Click to enter x Click to enter (cm)			
Kidneys (weigh/measure L and R)	L Weight Click to enter (g) Size Click to enter x Click to enter x Click to enter (cm) R Weight Click to enter (g) Size Click to enter x Click to enter x Click to enter (cm)			
Ureters				
Urinary bladder				
Gonads (ovaries/testes) (weigh/measure L and R)	L Weight Click to enter (g) Size Click to enter x Click to enter x Click to enter (cm) R Weight Click to enter (g) Size Click to enter x Click to enter x Click to enter (cm)			
Uterus / Cervix				
Prostate / Penis / Seminal vesicles				

Other Notes:

CNS / Musculoskeletal/Other:

Site	Description	Formalin	Frozen	Photo
Skeletal Muscle				
Joints				
Spinal Column				
Bone Marrow (femur or rib)				
Brain (describe also meninges)	Weight Click to enter (g)			
Pituitary	Weight Click to enter (g)			
Trigeminal ganglia				
Spinal cord				
Peripheral nerve (brachial plexus & sciatic)				
Lymph Nodes	Specify other submitted sites: Click to enter			

Other Notes:

Cardiac Worksheet *see GAHP Recommended Cardiac Necropsy Protocol for details:

Whole Heart Submission

Photographs:

☐ *In situ* ☐ Heart base ☐ 4 Views: Anterior, Right, Posterior, Left

Measurements:

Heart weight Click to enter (g) Heart circumference Click to enter (cm)

Fixed in Formalin to Submit:

☐Entire heart

Selected Section Submission

Photographs:

☐ *In situ* ☐ 4 Views: Anterior, Right, Posterior, Left

☐ Heart base ☐ 3 (or 4 for gorillas) slab sections from apex

☐ R AV valve ☐ Pulmonic valve

☐ L AV valve ☐ Aortic valve

Measurements:

Heart weight Click to enter (g) Heart circumference Click to enter (cm)

R AV valve Click to enter (cm) Pulmonic valve Click to enter (cm)

L AV valve Click to enter (cm) Aortic valve Click to enter (cm)

Fixed in Formalin to Submit:

☐3 or 4 cm slab cross-section

☐ R Atrium-Ventricle with R AV valve

☐ Interventricular septum w/ aortic valve

☐ L Atrium-Ventricle with L AV valve

☐ Aorta

☐ Conduction System (if submitting for detailed protocol)

GUIDE TO THE NONHUMAN PRIMATE POST MORTEM EXAMINATION
TIPS FOR TISSUE COLLECTION DURING THE NECROPSY EXAMINATION

Collection of tissues

Tissues to be fixed in 10% neutral buffered formalin should be less than 0.5 cm thick to (exception is brain, see below) allow for adequate penetration of formalin for fixation.

Initial fixation should be in a volume of fixative 10 times the volume of the tissues. Agitation of the tissues during the first 24 hrs is helpful to prevent pieces from sticking together and inhibiting fixation.

Labeling of specimens

If pieces are small or not readily recognizable (eg. individual lymph nodes) they can be fixed in cassettes or embedding bags or wrapped in tissue paper labeled with pencil or indelible ink. Another alternative is to submit lymph nodes with attached identifiable tissue, eg. axillary with brachial plexus, inguinal with skin, bronchial with bronchus, etc.

Sections from hollow viscera or skin can be stretched flat on paper (serosal side down) and allowed to adhere momentarily before being placed in formalin with the piece of paper. The paper can be labeled with the location from which the tissue came.

The formalin container should be labeled with the animals name or number, the age and sex, the date and location, and the name of the prosector.

Tissues to be Frozen

Archiving or biobanking is an important component of a thorough post mortem examination. Frozen tissues can provide a resource for pathogen discovery, toxicology, nutritional analysis, and genetic studies. Freezing at refrigerator freezer temperatures (about 0^0 F or – 18-20^o C) is adequate for toxicology and most nutritional studies, while ultralow temperatures (about -80^o C or colder) are better for genetic studies and pathogen discovery.

Recommended tissues:

Samples to be held at -20 C include 5-10 gm of liver, kidney, fat, stomach content, lower GI content.

Ssamples to be held at -80 C include 1-2 g lung, liver, kidney spleen, brain, and any specific lesions for which you can envision wanting pathogen discovery.

Additional samples

Swabs

Serum retrieved from chicken fat clots by centrifugation

Containers for freezing:

For -80 wrap small samples individually in foil and put together in a freezer safe baggie.

For -20 place tissues in individual freezer safe baggies such as WhirlPak.

Liquids can be frozen in freezer-safe cryotubes

Tissues to be preserved (10% neutral buffered formalin)

From the skin submit at least one piece without lesions, a nipple and mammary gland tissue, scent gland, and any lesions and subcutaneous or ectoparasites.

Axillary and or inguinal lymph nodes may be submitted whole from small animals and should be sectioned transversely through the hilus in large primates.

Mandibular, and/or parotid salivary glands should be sectioned to include lymph node with the former and ear canal with the latter.

Thyroids, if it is a small primate, may be left attached to the larynx and submitted with the base of tongue, pharynx, esophagus as a block. In larger primates, take sections transversely through the thyroids trying to incorporate the parathyroids in the section.

Trachea and esophagus and laryngeal air sac sections may be submitted as a block.

Cervical lymph nodes may be submitted whole if small or sectioned transversely.

Rib or femur can be used as a source of bone marrow. A marrow touch imprint may be made and air dried for marrow cytology.

Section of thymus or anterior pericardium should be taken perpendicular to the front of the heart.

Heart: See cardiac necropsy protocol for recommended measurements, photos and prosection guidelines.

Lungs: if possible inflate at least one lobe by instilling clean buffered formalin into the bronchus under slight pressure. Fix at least one lobe from each side and preferably samples from all lobes. In little animals the entire "pluck" may be fixed after perfusion.

Take sections of all levels of the GI tract including: gastric cardia, fundus and pylorus; duodenum at the level of the bile duct with pancreas attached; anterior, middle and distal jejunum; ileum; ileocecocolic junction with attached nodes; cecum and (in apes) appendix; ascending, transverse and descending colon. Open loops of bowel to allow exposure of the mucosa and allow serosa to adhere momentarily to a piece of paper before placing both bowel section and paper in formalin; or gently inject formalin into closed loops.

Liver: One section should include bile ducts and gall bladder and take sections from at least one other lobe.

Make sure sections of spleen are very thin if the spleen is congested; formalin does not penetrate as far in very bloody tissues.

Mesenteric (jejunal) nodes should be sectioned transversely; colonic nodes may be left with colon sections.

Take sections from each kidney: cut the left one longitudinally and the right one transversely so they will be identifiable.

Fix small adrenals whole and section larger ones (left -longitudinal and right transversely) making sure to use a very sharp knife or new scalpel blade so as not to squash these very soft glands.

Bladder sections should include fundus and trigone. Make sure to include round ligaments (umbilical arteries) in neonates.

Section the prostate with the urethra and seminal vesicles transversely. Section testes transversely.

In small females fix the vulva, vagina, cervix, uterus and ovaries as a block after making a longitudinal slit to allow penetration of formalin. Rectum and bladder (opened) can also be included in this block. In somewhat larger animals make a longitudinal section through the entire track. In large primates make transverse sections of each part of the track and the ovaries.

If gravid: weigh and measure placenta and fetus. Perform a post mortem examination of the fetus. Take sections of disc from periphery and center and from extraplacental fetal membranes. Take sections of major organs and tissues of fetus.

The brain should be fixed whole, or, if too large for containers, may be cut in half longitudinally (preferred) or transversely through the midbrain. It should be allowed to fix for at least a week before sectioning transversely (coronally) into 0.5-1.0 cm slabs to look for lesions. Submit the entire brain if possible and let the pathologist do the sectioning, otherwise submit slabs from medulla, pons and cerebellum, midbrain, thalamus and hypothalamus, prefrontal, frontal, parietal and occipital cortex including hippocampus and lateral ventricles with choroid plexus. In older apes it is especially important to examine prefrontal and frontal cortex and hippocampus for senile plaques and vascular changes.

> *Instead, institutions may elect to send brains to the Great Ape Aging Project (separate protocol). This is a research project which does not perform diagnostic histopathology (as of Jan 2015). If histopathology is desired, the prosecting pathologist may need to modify diagnostic tissue handling/selection. Contact the Great Ape Aging Project PIs for more information.*

Fix the pituitary whole. Put pituitary in an embedding bag if it is small. Also remove and fix the Gasserian (trigeminal) ganglia.

Spinal cord - if clinical signs warrant, remove the cord intact and preserve it whole or in anatomic segments (eg. cervical, anterior thoracic etc.)

Take bone marrow by splitting or sawing across the femur, to get a cylinder and then make parallel longitudinal cuts to the marrow. Try to fix complete cross sections or hemi-sections of the marrow.

Take sections of any and all lesions, putting them in embedding bags if they need special labeling.

Remember, it's better to save "too many" tissues than to risk missing essential lesions or details.

This represents a lot of work on the part of the prosector, often under less than comfortable conditions. But the effort expended at the time of the gross post mortem is much appreciated by the histopathologist, and is crucial to our investigations of the causes of morbidity and mortality of free-living nonhuman primate

THANK YOU !!!!!

WORKSHEET
GREAT APE TAG PLACENTAL EXAMINATION

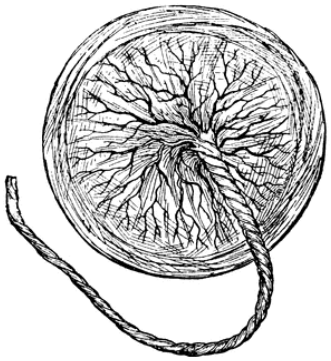
Dam name _____Stud book #_____
Infant/fetus weight _____gm, Infant crown-rump length_____cm Sex: M F U
Status of infant (circle all that apply): term, preterm, alive healthy, alive weak or ill, dead, singleton, twin, vaginal birth, C-section, other _____

PLEASE INSERT PHOTOGRAPHS OF BOTH SIDES OF THE PLACENTA WITH ATTACHED CORD AND MEMBRANESDESCRIPTIONS AND MORPHOMETRICS OF THE PLACENTA AND CORD

PLACENTA (Circle all that apply): complete, partial, disc, membranes, cord, fresh, desiccated, clean, contaminated, meconium, hemorrhage.
Describe other_____
Umbilical cord:
Cord length_____cm, Cord diameter_____cm, Twists: N= _____
Cord cut surface: number of arteries_____vein(s)_____ other structures?_____,
Warthin's jelly_____ Desication?_____
Cord color (white, tan, brown, green, red. Other_____),
Lesions: hematomas, exudate, edema, knots (N=_____),
other_____
Cord insertion: central, marginal, on disc, within membranes

Fetal membranes
Insertion; percent_____ location: marginal, circumvallate, circummarginal
Color_____ Exudates?_____Hemorrhage?_____
Trimmed placental weight (minus membranes and cord)_____ gm
Placental disc greatest diameter_____cm x thickness_____cm
Fetal surface (photograph): WNL, smooth, rough, vessels, thrombi, hemorrhage, percent surface affected _____other_____
Maternal surface (photograph): WNL, complete, disrupted, excessively nodular or masses, hematomas, pallor, fibrin, percent surface affected _____, other_____
Parenchyma cut surface: normal (= meaty, spongy, red); lesions: marginal, central, dark, pallor, exudative, percent disc affected_____ Other_____
Samples taken:
Histology/formalin – location and number of samples
Culture: (bacterial, fungal viral)
Frozen (refrigerator freezer, ultralow freezer, Liquid nitrogen, dry ice)

Adapted from: http://www.uptodate.com/contents/gross-examination-of-the-placenta#



usf.edu/clipart/26100/26112/placenta_26112.htm

You may use this diagram to note extent and location of lesions

WORKSHEET
GREAT APE TAG FETUS/NEONATE/INFANT POSTMORTEM EXAMINATION

Identification number or name_____ Stud Book #_____

Age _____ days. Weight _____gm. Crown-rump length _____cm.

Placenta available? Yes No , eaten by dam, eaten by other group members, fate unknown, other?_____

Post mortem condition (fresh, mild, moderate or severe autolysis)
Post mortem interval (death to examination):_____ hours, days
Other body measurements: head circumference _____cm, thoracic circumference _____cm, abdominal circumference _____cm

EXTERNAL EXAMINATION (circle all that apply or describe)

Nutritional status: emaciated, thin, adequate, abundant fat, other_____
Muscle development: hypoplastic or atrophic, well-muscled, pink, dark red
Umbilicus: Fresh desiccated, color_____(stump length _____cm),

Hair coat: naked, sparse, luxuriant, head only, epilates easily, other_____

Skin: hemorrhage, other discoloration, lacerations, maceration, other_____, location of lesions _____

Peripheral lymph nodes: indicate nodes examined and any abnormalities _____
_____

ORAL CAVITY:

Dentition: erupted teeth _____, enamel (pigmented, pitted, linear erosions, on _____ teeth,

Palate: intact, cleft (photo or describe _____)

Tongue: pigmented, coated, erosions, plaques, ulcerations, other_____
Lips and buccal surfaces: NSL, lacerations, hemorrhage, other _____

EYES: NSL, micro-ophthalmia, cornea cloudy, lens opaque, hemorrhage, other_____

EARS: pinna: hemorrhage, lacerations, other _____

NECK REGION:

Thyroid(s): flat, visible follicles, nodular, red, amber, tan, parathyroids visible? ☐Yes ☐ No
Retropharyngeal and mandibular lymph nodes: small, enlarged, other_____
Esophagus: empty, full, dilated, thickened, erosions, ulcerations, plaques, other

INTERNAL EXAMINATION:

Viscera position (photo viscera in situ): normal, situs inversus, individual organs displaced_____

THORAX: negative pressure? Yes No. Effusion? none, clear, serosanguinous, blood, pus, fibrin, other _____ amount _____ cc

THYMUS: mediastinal only, mediastinal and cervical, size: _____cm x____cm x ____cm; _____gm

HEART: Pericardial effusion? ☐ Yes ☐ No , character_____, epicardial fat: none, little, moderate, abundant, moderate, little, serous atrophy; epicardial fibrosis? ☐Yes ☐ No. Please photo (all 4 sides if possible).

DUCTUS ARTERIOSUS: open, probe patent, closed, length _____cm

Mid-Ventricular transverse section _____ cm from apex: right ventricular free wall _____cm, left ventricular free wall _____cm, septum _____cm;

Open along lines of flow: Foramen ovale (closed, open, probe patent, dye patent)

Myocardium: NSL, pale streaking, masses, other_____

Right AV valve circumference _____cm, Left AV valve circumference_____ cm, pulmonic valve circumference _____cm, aortic valve circumference _____cm

Valves (RtAV): normal number of leaflets, abnormal number leaflets (photo or describe), smooth nodules, rough nodules, adherent thrombi? Other:
_____

LAV valve: normal number of leaflets, abnormal number of leaflets (photo or describe), smooth nodules, rough nodules, adherent thrombi? Other:

Pulmonic valve: normal number of leaflets, abnormal number of leaflets (photo or describe), smooth nodules, rough nodules, adherent thrombi? Other:

Aortic valve: normal number of leaflets, abnormal number of leaflets (Photo or describe), smooth nodules, rough nodules, adherent thrombi? Other:

Coronary ostia: number and location (photo if possible):

LUNGS:

Color: light pink, red, purple, other _____; Atelectasis: none, partial, diffuse) weight

left_____gm, right _____gm,

Lobation left N= _____, right N= _____

Cut surface: aerated, dry, oozes fluid: clear, foamy, tan, pink, red, other_____.

Trachea and Bronchi: clear, foam, thin fluid, bloody fluid, mucus, pus

Hilar (tracheobronchial) lymph nodes; small, enlarged, cut surface: dry, oozes lymph, exudate?

Other _____

ABDOMINAL CAVITY: Effusions? ☐Yes ☐ No. Type: clear, serosanguinous, blood, pus, fibrin.

Adhesions Yes, No. Character: fibrinous, fibrous, easily broken down, firm, other _____

Diaphragm: intact, hernia, other _____

Omental and mesenteric fat: none, sparse, moderate, abundant. Color: white, off white, yellow, orange

LIVER: extends beyond sternum? ☐ Yes ☐No _____cm); Weight _____gm

Color (tan, brown, red-brown, dark red/purple, green tinged, other _____),

Gall bladder: empty, full, opaque, translucent. Bile: yellow, green, brown, red, watery, chunks or flakes.

Other?_____

Umbilical vein/falciform ligament: NSL, thickened, rough surface, discolored, other _____

SPLEEN: Size _____cm x _____cm x _____cm. Weight:_____gm;

Color: pale, dark red, purple, other _____ cut surface (dry, oozes blood, exudate, nodules, visible white pulp), Other_____

KIDNEYS:

Left kidney _____cm x_____cm x_____cm. Weight _____gm

Right kidney _____cm x _____cm x _____cm. Weight _____gm

Capsules: smooth, pitted, undulating, other_____; capsule peels easily, with difficulty, other, Cut surface: pale streaks (fibrosis), wedge shaped foci pale or red (infarcts), exudates, Other _____

_____

ADRENALS: Left _____cm x _____cm x _____cm Weight_____

Right _____cm x _____cm X_____cm. Weight_____

Cortex_____, medulla_____ lesions?

BLADDER: empty, full _____cc, color: clear, yellow, red, opaque, granular, other _____, Round ligaments (umbilical arteries) (NSL, hemorrhage, fibrin, exudates)

STOMACH: empty, full, distended. Content: water, mucus, curdled milk, other_____.
Mucosa: NSL, multifocal erosison, red or black spots, ulceration, discoloration, describe or other
_____

DUODENUM: content: empty, scant, abundant, mucus, curdled milk, other _____
Mucosa: Tan, green, brown, red, other _____

PANCREAS: Size: NSL, abundant, scant, Other _____
Color/appearance: cream-colored, tan, brown, hemorrhagic, edematous, other _____

JEJUNUM: content: empty, scant, abundant, mucus, color of content _____other
_____
Color of content and mucosa: tan, green, brown, red, other _____

ILEUM: content: empty, scant, abundant, mucus, other _____
Color of content and mucosa: tan, green, brown, red, other _____

CECUM: content: empty, scant, abundant, mucus, feces, other _____
Color of content and mucosa: tan, green, brown, red, other _____

APPENDIX: _____ cm long x _____cm diameter. Content: empty, scant, abundant, mucus, feces, other _____
Color of content and mucosa: tan, green, brown, red, other _____

COLON: empty, scant, abundant, mucus, feces, other _____
Color of content and mucosa: tan, green, brown, red, other _____

RECTUM: Content: empty, distended, liquid feces, pasty feces, formed normal feces, hard dry feces
Color of content and mucosa: tan, green, brown, red, other _____

MESENTERIC, ILEOCECAL and COLONIC LYMPH NODES: small, enlarged, cut surface edematous, bulging cortex, Other _____

PERIAORTIC and INTERNAL ILIAC LYMPH NODES:
SKULL: sutures (open, closed) PHOTO; Anterior Fontanelle closed, open _cm x __cm; posterior fontanelle closed, open _____cm x ___cm. (Photo if possible)

BRAIN: meninges (wet, dry, congestion, edema, exudates, hemorrhage, other_____)
Weight _____gm

SPINE:

Spinal column: NSL, spinal bifida, scoliosis, kyphosis, other defects

_____

Spinal cord: not examined, NSL, hemorrhage, exudates other_____

APPENDICULAR SKELETON:

Growth plates and costochrondral junctions: NSL, wide, flared, inflamed, other:

_____

Ration of cortices to medullary cavity: _____

ANCILLARY DIAGNOSTICS:

Cultures _____

Tissues frozen _____

Cytogenetics _____

PLEASE SUMMARIZE YOUR IMPRESSION OF THIS CASE:

POST MORTEM EXAMINATION OF THE AIR SACS OF APES

Information on air sac anatomy is especially important for bonobos, chimpanzees and orangutans as there are no definitive papers on their air sac anatomy

Examine the skin over the air sac for signs of fistulae or scars. Note thickness of the skin and presence/amount of fat.

Incise the air sac through the skin on the anterior (ventral) aspect.

Note color and texture of air sac lining.

Note presence of absence of exudates, and character of exudate.

Note presence or absence of compartmentalization by connective tissue.

Note extent of air sacs (e.g. under clavical, into axilla, etc.)

Is there a central compartment?

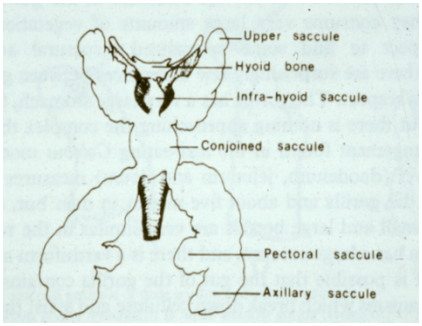
Are the lateral sacs symmetrical (they may vary in size in chimpanzees and bonobos)

Identify and describe the opening(s) from the larynx into the air sac (e.g. single slit-like opening or paired oval openings). Are the openings parallel or perpendicular to the long axis of the larynx and trachea. Note any exudate within the ostia

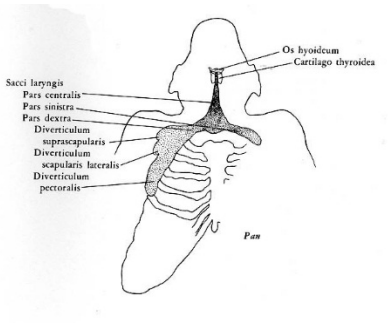
Note the location, size and shape of the opening in the larynx (e.g. from lateral saccules or centrally at the base of the epiglottis).

Cultures: Please culture several different sites within the air sacs (we need data to determine if infections are "homogeneous" or compartmentalized).

Diagrams of air sacs to aid in measurements and descriptions.



Gorilla air sacs (From Dixon)



Chimpanzee air sacs (From Swindler & Wood)