

**ASSESSMENT FOR CERTIFICATION OF COMPETENCE IN
FETAL MORPHOLOGICAL EXAMINATION**

LABORATORY LITTER ASSESSMENT - SKELETAL



**THE INTERNATIONAL REGISTER OF FETAL
MORPHOLOGISTS**

LABORATORY LITTER ASSESSMENT - SKELETAL

Name of Candidate: _____ Lisa Crawford _____

Name of Applicant (Laboratory):	Lisa Crawford, Charles River Laboratories
Examination type assessed (species):	SKELETAL EXAMINATION RAT
Date of assessment:	December 6, 2018
Names of assessors:	Joyce Rendemonti and Bill Nowland

Specimens used for assessment: [insert Study code, litter and fetus ID in each box]

1	2	3	
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Key for abbreviations:

P - Needed prompting

PP - Needed frequent prompting

N - Nervous

VIP - Volunteered information previously

DK - Didn't know the answer

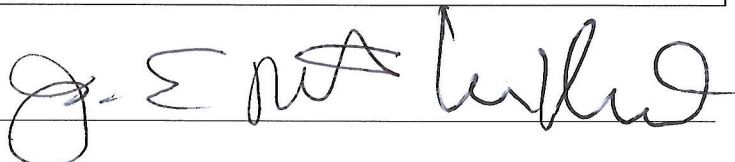
NC - Not consistent in technique

Assessor's Summary:

[delete or underline to highlight the appropriate description from the options below:]

Competent/competent and focussed / engaged and focussed during the assessment, and demonstrated / effectively communicated a sound knowledge / an impressive understanding / of all aspects

Assessor signatures



Date

06 Dec 2018

LABORATORY LITTER ASSESSMENT - SKELETAL

Name of Candidate: _____ Lisa Crawford _____

COMMENTS FROM LABORATORY SPECIMEN EXAMINATION: [insert free text in boxes]

Talk through/procedure

Question	Acceptable Response	Response
Describe to me what you are doing; what do you see; what are you looking at?	Clearing fat Turning specimen Examination from all sides Manipulation for clarification	Starting at head working to tail Frontal view, orbits Mandible, Maxilla on dorsal side I don't count count on the ventral side
What are you looking at now		
Describe what you see		
Note how candidate is recording observations – as they are found or at the end of the examination?	At the time I see it.	
Check that specimen is being manipulated appropriately.	yes	

LABORATORY LITTER ASSESSMENT - SKELETAL

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Consistency in procedural routines

Question	Acceptable Response	Response
Can you think what the importance of consistency in magnification across examiners might be	Consistency important so that all examiners see and record to the same level of detail.	Every body will have the same level of detail.
Do you always use the same sequence / routine for examination? Why do you think that it is important?	Yes – don't miss anything out, important for pattern recognition, subconscious alert.	Yes.
Do you think it is necessary to look at structures from more than one aspect?	Yes - gain clear view of 3D structure, enable all structures/aspects of structures to be seen clearly.	especially in the vertebral column
Do you always count the vertebrae/ribs? Why do you think it's necessary?	Yes, (changes in numbers could be associated with anterior/posterior positional shifts)	Each region has a range could be a shift in the vertebral column.

Terminology and recognition levels used

Question	Acceptable Response	Response
How do you ensure other examiners are using the same terms as you for the same observation?	User guides and recognition levels	Photo glossary
How do you decide whether or not to record observations?	Discuss with colleagues Reference material, user guides, laboratory recognition levels, background data	glossary with descriptions
What could you do to make sure that you've chosen the most accurate term?	Peer review/consistency check (examiner records should be traceable)	
Would you assign a severity level, why?	User guides and recognition levels	Some terms used in the Anterior / Posterior Forelimb
How do you ensure other examiners are using the same severities as you for the same observation?	Discuss with colleagues Reference material, user guides, laboratory recognition levels, background data Peer review/consistency check (examiner records should be traceable)	

LABORATORY LITTER ASSESSMENT - SKELETAL

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Recognition of artefacts

Question	Acceptable Response	Response
How would you decide if real or artefact?	Margins of the structure smooth or jagged, as if shearing has taken place Pieces don't fit together	looking for damage
Does the condition of adjacent bones support your decision?	Excessive maceration evident, resulting in break-down of the soft tissues holding the skeleton together, particularly the extremities, such that bones have become detached	during staining of vertebral bones could be ripped out
What procedural errors are likely to lead to artefacts	Processing has caused shrinkage, e.g. in the brain, causing the cranium to collapse Specimen has possibly not been completely immersed in processing fluids or stain, resulting in ossified areas being unstained Specimens have been clumped together, causing non-uniform penetration of the stain	
Can you think of any observations which could caused by an artefact?	Specimen has been fixed in a posture that has caused the rib cage to appear asymmetrical, the pelvis to appear out of alignment, or the limbs to appear distorted Refer to necropsy observations	missing thyroid last rib ripped off tip of tail cut off
Would you record artefacts	Explain how	
How would you record an artefact?		

Correct identification of anomalies

Question	Acceptable Response	Response
What could you do to make sure that you've chosen the most accurate term	Refer to recognition levels and user guides	Use the glossary also have a photo glossary ask peers

LABORATORY LITTER ASSESSMENT - SKELETAL

Name of Candidate: Lisa Crawford

Question	Acceptable Response	Response
Why have you used that term (e.g.) - Not ossified or absent - bipartite ossification or bipartite - incompletely ossified or small - Interrupted or incompletely ossified	Reason should be based on structures present, <u>cartilage precursors</u> , space for bones to ossify, symmetry/alignment.	is small right supra, cartilage maxilla is small it incomplete may have stopping in the position
What might you see in(add bone or area) <u>Thoracic</u>	Arches / centrum missing, about rib, - fused - Absent	
What might you see in(add bone or area) <u>Hand/Dub</u>	Long bones bent, short, misshapen	

Demonstration of knowledge of consequence of findings (choose minimum of 3 from this section)

What else might you see with:		
If more or less than the usual number of ribs were present at the thoracolumbar border what else might you expect to see?	Pelvic girdle position/number of and form of all vertebrae/length of ribs /ventral crest (rabbit) /check for branching /fusion of ribs	
Single naris	Fusion of skull premaxillae/nasals/frontals single incisor socket displaced orbital sockets, form of mandible.	
Absent tail [at external observation]	Check for presence for caudal vertebrae	
Domed head	Check for artefact and size of fetus, fused frontals.	bones surrounding the sutures frontal parietals both at orbit 2 symmetrical look at base of skull. could be a indicator that something is going on.
Short lower jaw	Check presence/fusion of mandible, dental sockets.	Cleft palate is going on. Maxilla. Nares, Orbit look at limbs too

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What else might you see with:		
Flat cranium / occipital projection	Check for vertebral splaying/spacing/spina bifida Malrotated limbs	
What would you expect to record in association with low fetal weight?	Phalanges/metacarpals/metatarsals/caudal vertebrae, cervical centra. Order of sternebral, digit and vertebral centrum ossification. [Check day of PM if whole litter affected.]	
Or high fetal weight?	Phalangeal ossification, cervical and caudal vertebra ossification, size of suture/fontanelle, omosternum, epiphyseal ossification, presence of calcaneum, astragalus, elongated acronium and metacromium processes. [Check day of PM if whole litter affected.]	exaggerated ossification long bones more defined ends are ↑ Caudal Takes and calcaneus present.

Awareness of importance of communication lines as reaction to unusual findings

Question	Acceptable Response	Response
What would you do if you had never seen a finding before; if you were unsure how to describe an observation	Discuss/review findings with colleagues, refer to recognition levels/user manuals/training material/background data; discuss with manager	talk to my peer. look at the glossary go get it and take all information to APB. she would be confirming!

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Awareness of the possibility of anomalies in cartilaginous structures surrounding anomalous bones

Question	Acceptable Response	Response
Do you examine any cartilaginous areas?; Which ones	Yes – sternebral/costal, intervertebral discs, pelvic girdle	Hypoid Area Sternebra - look at costal cartilage Ribs 5 - look at cartilage for cost
How do examine cartilage in single stained specimens?	Manipulation of specimen to visualise cartilage, lighting, processing.	you can still see a model, you can play with the light.
Why do you think that it is helpful to record cartilage observations?	Fused sternebrae/ribs, branched ribs, extra ribs, pelvic girdle articulation.	study may have requested cartilage staining.

Additional comments

**EXAMPLES OF RAT SKELETAL ABNORMALITIES - ASSESSMENT
SPECIMENS (NORTH AMERICA)**



THE INTERNATIONAL REGISTER OF FETAL MORPHOLOGISTS

Examples of rat skeletal abnormalities - Assessment Specimens (North America)

Candidate Name: _____ Lisa Crawford _____

Name of Applicant (Laboratory):	Lisa Crawford, Charles River Laboratories
Examination type assessed (species):	SKELETAL RAT
Post coitum day at termination:	Gestation Day 21
Date of assessment:	6 December 2018
Names of assessors:	Joyce Rendemonti and Bill Nowland

Key for abbreviations:

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Assessor signature: _____



Date: _____

6 December 2018

Examples of rat skeletal abnormalities - Assessment Specimens (North America)

Candidate Name: Lisa Crawford

Rat Specimens	Abnormalities	Comment
A Sprague Dawley Day 21pc (Located at: King of Prussia, PA)	Sternebrae, incompletely ossified, 1st and 2nd Cervical Vertebrae, Arch, Incompletely Ossified, 4th and 5th right, 2nd left Ventral Tubercle (Odontoid Process/Dens), Incompletely Ossified Rib, Supernumerary 14th, bilateral (full) Forepaw Metacarpal 1st Not Ossified, bilateral	misshapen → misshapen unossified hyoid
	<u>other possible comments:</u> Frontal, incompletely ossified, bilateral [borderline] Damaged, Hyoid (missing) Sternebrae, asymmetric (step shaped), 3rd-5th Cervical centra none ossified (1st - 7th) Thoracic Vertebrae, centrum incompletely ossified/misshapen, 11th (V-shaped) Lumbar Vertebrae 6 (thor/lum total = 20) Femur, incomplete ossification [borderline] tibial end, bilateral Damaged Pubis, left (2 pieces) Forepaw phalanges: ^{all} proximal 1st, 2nd, 5th not ossified bilateral; medial 2nd-5th not ossified, bilateral Hindpaw phalanges: ^{all} proximal 1st-5th not ossified, bilateral, medial 2nd-5th not ossified, bilateral	All skull bones are faded and possibly unossified 3rd right arch & centrum lumbar 4th as well pubis unossified ischiun unossified ilium incomplete 3 sacral — caudal unossified

Examples of rat skeletal abnormalities - Assessment Specimens (North America)

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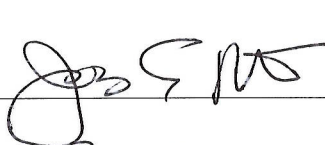
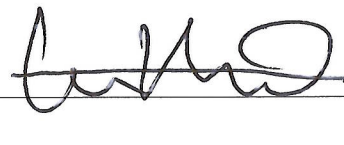
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  WSN

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RAT ALIZARIN RED S SKELETAL SPECIMEN IMAGES FOR CERTIFICATION



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THIS FORM WAS UPDATED IN SEPTEMBER 2018 – CHECK THAT YOU ARE USING THE CORRECT VERSION

RAT ALIZARIN RED S SKELETAL SPECIMEN IMAGES FOR CERTIFICATION

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Name of Applicant (Laboratory):	Lisa Crawford, Charles River Laboratories
Examination type assessed (species):	SKELETAL RAT
Date of assessment:	December 6, 2018

Specimens used for assessment: [\[insert fetus ID in each box\]](#)

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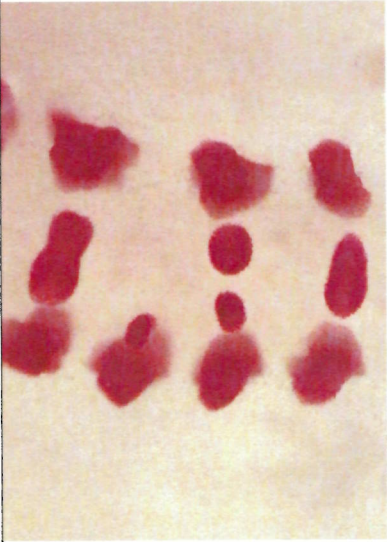
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Assessor signature ENT

Date 06 Dec 2018

RAT ALIZARIN RED S SKELETAL SPECIMEN IMAGES FOR CERTIFICATION

Name of Candidate: Lisa Crawford

Image 4	Question	Answers given
	What is the observation/what can you see? - absent hemicentrum and left vertebral arch "hemivertebra" - i.e. right hemicentrum? fused to left via - bipartite and asymmetrically ossified centrum [discuss] - scoliosis "top" centres offset	looks like lumbar unilateral centrum above bipartite need to look at different angles
	What might you want to say about this? - Would the dorsal aspect add any more info? - Looks like scoliosis; this would need to be checked - Are the left arch and left hemicentrum really absent rather than unossified? (The discs above and below appear to be fused on the right side so they are probably absent) - Are the right hemicentra (2nd and 3rd from the top) small or incompletely ossified? - Is the centrum with bipartite ossification also split (cartilage)? - Are the centra at the top and bottom of the image incompletely ossified or misshapen? - Some of the vertebrae could be recorded as misaligned	it could other half is absent just say unilateral looking a pairs, Arch absent, therefore it's a hemivertebra with attached centrum.

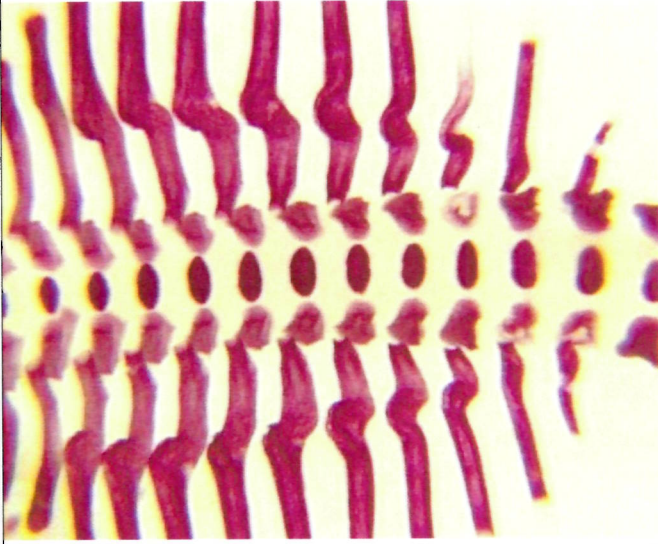
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	How would you make sure that you were recording the correct observation? • Look at ventral and dorsal views • Use of intervertebral discs	
	What else might be associated with this finding? • Looks like scoliosis; this would need to be checked Comments • Would you expect to this finding to be evident externally? <u>ND</u> • difference between displaced centrum and IO/ hemicentrum not ossified/ hemivertebra • What might make you comment on centrum below unossified centrum? • bipartite oss vs bipartite, structural • Would you attach a severity to this observation? If so, what would it be and why? <u>ND</u>	

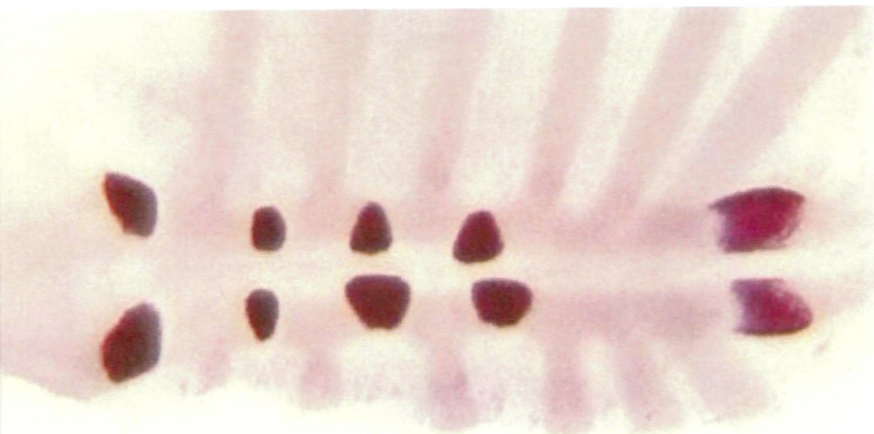
RAT ALIZARIN RED S SKELETAL SPECIMEN IMAGES FOR CERTIFICATION

Name of Candidate: Lisa Crawford

Image 5	Question	Answers given
	What is the observation/what can you see? • medially thickened/kinked/wavy ribs • irregularly ossified rib, distally and last ribs(?13th) medially • i.o thoracic vertebral arches → it on left, 2 on the right	- some k radiated - describe as medially
	What might you want to say about this? • Are any of the ribs noticeably shortened? • What would the dorsal aspect reveal?	- some are completely ossified at the end
	How would you make sure that you were recording the correct observation? • The ribs would need to be viewed from all angles to check which ones are kinked	1st rib, look 10 not interrupted, would want to zoom in to make the cell check by anatomy will give info
	What else might be associated with this finding? • Sternum distortion	- definitely at 10th rib, 1 vs wavy
	Comments • Would you record position of kink/IO • Would you attach a severity to this observation? If so, what would it be and why?	not always, maybe a shortened torso — ND

RAT ALIZARIN RED S SKELETAL SPECIMEN IMAGES FOR CERTIFICATION

Name of Candidate: Lisa Crawford

Image 7	Question	Answers given
	What is the observation/what can you see? • Cleft (or split sternum) • Bipartite or cleft sternbrae 1, 2, 3, 4, 6 • Sternebra 5 not ossified • (Bipartite xiphoid cartilage)	each cartilage is bifurcated with no tissue in between. 2nd is 10 compared to 1st.
	What might you want to say about this? • Were there any costal cartilages from rib 1. • (Costal carts below sternbra 4 are a bit misaligned but I wouldn't comment on them when there is a split sternum)	not enough #1 is misshapen
	How would you make sure that you were recording the correct observation? • Assess the presence of cartilage	
	What else might be associated with this finding? • Was there any ventral midline closure problem detected at external/visceral exam?	not necessarily
	Comments • How does examination of cartilage help in clarification of this finding? • How would you discriminate between not ossified and cleft? • Would you attach a severity to this observation? If so, what would it be and why?	you would be able to see that there is a space between these bones they will not ossify together. ND

RAT ALIZARIN RED S SKELETAL SPECIMEN IMAGES FOR CERTIFICATION

Name of Candidate: Lisa Crawford

Image 8	Question	Answers given
	What is the observation/what can you see? • Bent scapula	Body looks short. Ala is misshapen
	What might you want to say about this? • Check that it is not artefact • Is the left scapula also bent • Are there any problems with the forelimb long bones or clavicles?	
	How would you make sure that you were recording the correct observation? • Compare to normal scapula	There could be part very close or smaller.
	What else might be associated with this finding? • Flexures/bent/short/thick long bones	Compared to a normal scapula in her dish
	Comments • Is the specific part of the scapula recorded as bent (blade v/ spine) • Would you attach a severity to this observation? If so, what would it be and why?	

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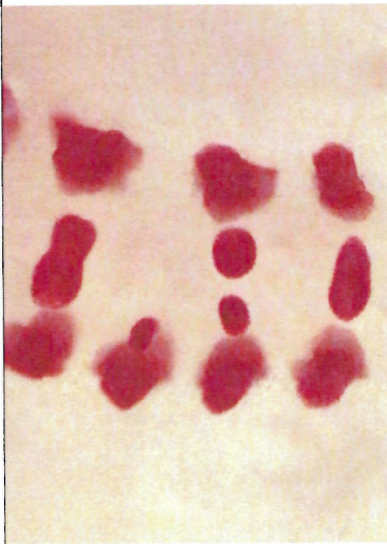
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	What might you want to say about this? • Would the dorsal aspect add any more info? • Looks like scoliosis; this would need to be checked • Are the left arch and left hemicentrum really absent rather than unossified? (The discs above and below appear to be fused on the right side so they are probably absent) • Are the right hemicentra (2nd and 3rd from the top) small or incompletely ossified? • Is the centrum with bipartite ossification also split (cartilage)? • Are the centra at the top and bottom of the image incompletely ossified or misshapen? • Some of the vertebrae could be recorded as misaligned	yes yes

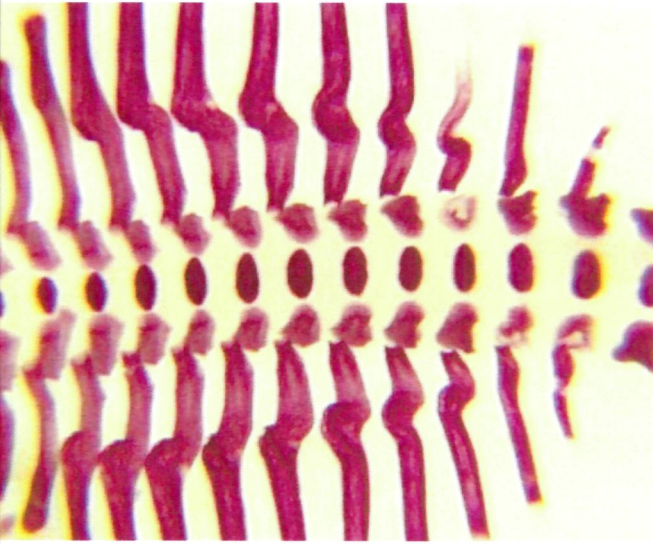
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	How would you make sure that you were recording the correct observation? • Look at ventral and dorsal views • Use of intervertebral discs	<u>yes</u>
	What else might be associated with this finding? • Looks like scoliosis; this would need to be checked	
	Comments • Would you expect to this finding to be evident externally? • difference between displaced centrum and IO/ hemicentrum not ossified/ hemivertebra • What might make you comment on centrum below unossified centrum? • bipartite oss vs bipartite, structural • Would you attach a severity to this observation? If so, what would it be and why?	<u>- NO</u> <u>- absent cartilage</u> <u>- No severity</u>

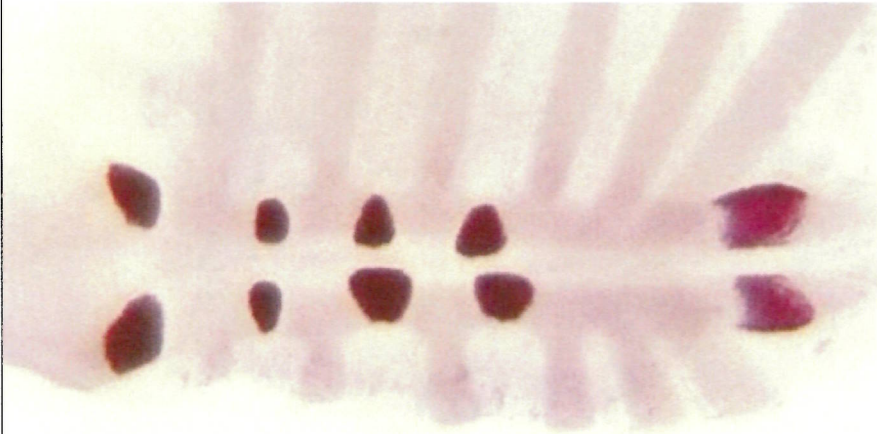
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Image 5	Question	Answers given
	What is the observation/what can you see? • medially thickened/kinked/wavy ribs • irregularly ossified rib, distally and last ribs(?13th) medially • i.o thoracic vertebral arches	Incomplete arch ossification and ribs
	What might you want to say about this? • Are any of the ribs noticeably shortened? • What would the dorsal aspect reveal?	
	How would you make sure that you were recording the correct observation? • The ribs would need to be viewed from all angles to check which ones are kinked • count ribs/vertebrae	lexicon would be consulted
	What else might be associated with this finding? • Sternum distortion	thickened is not a finding but medullated is and proximal, medial or distal
	Comments • Would you record position of kink/IO • Would you attach a severity to this observation? If so, what would it be and why?	— yes — NO May be shorter torso, edema,

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	How would you make sure that you were recording the correct observation? • Assess the presence of cartilage	
	What else might be associated with this finding? • Was there any ventral midline closure problem detected at external/visceral exam?	probably not
	Comments • How does examination of cartilage help in clarification of this finding? • How would you discriminate between not ossified and cleft? • Would you attach a severity to this observation? If so, what would it be and why?	At high mag there is probably no tissue or cartilage maybe #1 misshapen and #2 maybe incomplete None

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	What is the observation/what can you see? Bent scapula	possible small scapula and misshapen etc
	What might you want to say about this? - Check that it is not artefact - Is the left scapula also bent - Are there any problems with the forelimb long bones or clavicles?	could be bent long bones
	How would you make sure that you were recording the correct observation? Compare to normal scapula	
	What else might be associated with this finding? Flexures/bent/short/thick long bones	
	Comments - Is the specific part of the scapula recorded as bent (blade v/ spine) - Would you attach a severity to this observation? If so, what would it be and why?	- No