Virtual Animal Anatomy:

Introduction and Training

Christianne Magee, DVM, PhD, DACT

Andrea Linton, MS

College of Veterinary Medicine and Biomedical Sciences



Colorado State University

Animal Anatomy Instruction at CSU Strategically scaffolding learning

To systematically build on

students' experiences and

knowledge as they

are learning new skills



Bloom's Taxonomy

Create Produce new original work or teach others *design, assemble, construct, conjecture, develop, author, investigate*

Draw connections among ideas

Justify a stand or decision defend, appraise, argue, judge, select, support, value, critique

analyze

evaluate

apply

understand

remember

differentiate, organize, compare, contrast, examine, experiment

Use information in new situations demonstrate, interpret, operate, sketch, implement

> **Explain ideas or concepts** *describe, discuss, identify, recognize, select, classify*

Recall facts and basic concepts *define, duplicate, list, memorize, repeat*



🞲 Colorado State University

Learner Preferences in Anatomy



Quinn et al., Anat Sci Ed 2017. DOI 10.1002/ase.1748 Neel and Grindem, JVME 2010. DOI 10.3138/jvme.37.4.347









🐼 Colorado State University





🐼 Colorado State University

Virtual Animal Anatomy

- Virtual Canine Anatomy (VCA)
- Virtual Equine Anatomy (VEA)
- Virtual Bovine Anatomy (VBA)
- Virtual Feline Anatomy (VFA)

Teaching with the VCA

- Enhances student learning (Linton et al., 200
 - The *accuracy* and *repeatability* of the virtual cadaver experience, particularly outside of the laboratory environment, allows for greater *flexibility* in learning
 - Enhanced student control of learning sequence and pacing results in more self-directed learners
- Improves teaching efficacy*
- VCA page views correlates to student performance*

(*Magee, manuscript in preparation)

What does it take to get an 'A' in BMS305?

- High Grade (A, B) Students spent less time overall per week than Low Grade (C,D,F) Students; but they spent more time on Open Lab, Lecture Echoes, and the VCA
 - 'A' students spent *significantly* more time in <u>Open Lab</u> than the rest of the students in the class (4.5 vs. 2.9 h/wk)
 - 'A' students found written and video <u>Tours</u> and <u>Open Lab</u> time more helpful than 'B's
 - 'A' students used all of the Virtual Anatomy Programs more than the rest of students *before* and *after* open lab each week, particularly use of the <u>VCA before lab</u>.

Johnson, Magee, Burns. 2015 "What is TILT "course quality"? What is TILT "assessment"? CSU PDI.

🞲 Colorado State University

VCA Outcomes: Dissection

"Virtual Canine Anatomy Improves Teaching Efficacy and the Learning Ecology of Dissection" manuscript in preparation

Experimental Design

- Canine pelvic limb dissection, 3 h
- n=19 dissectors/group +/- VCA
- Teaching Assistant (TA) Visits
 - Number and duration of visits
- Quiz at the end of the dissection





Change Anatomy Program 🔻

Virtual Canine Anatomy



Start Program

Sections

Head	Neck	ANS/CNS	Thoracic Limb	Pelvic Limb	Thorax	Abdomen and Pelvis	Quizzes	Dissection Movies 🔻
------	------	---------	---------------	-------------	--------	--------------------	---------	---------------------

Head Directional Terms



Head Directional Terms

Head Osteology



External Skull Features



Internal Skull Features



Mandible



Dentition



Dental Directional Terms

VIRTUAL CANINE ANATOMY Home



Directional Terms: Head

dorsal plane midsagittal plane transverse plane

caudal
dorsal
lateral
medial
rostral
ventral





© 2019 Colorado State University

Search

ዓ 🛱



Larynx 1: Superficial Dissection Search



© 2019 Colorado State University



m. thyrohyoideus

O: lamina of thyroid cartilage I: thyrohyoid bone A: draw hyoid apparatus caudad N: hypoglossal n.

Larynx 2: Superficial

Dissection

- m. cleidomastoideus (cut)
- m. digastricus
- m. longissimus capitis
- m. longissimus cervicis
- m. longus capitis
- m. masseter
- m. mylohyoideus
- m. omotransversarius (cut) m. scalenus
- m. semispinalis capitis, m.
- complexus
- m. serratus ventralis
- m. sternocephalicus (cut)
- m. sternohyoideus
- m. sternothyroideus
- m. thyrohyoideus
- mm. intertransversarii

2nd cervical n. 3rd cervical n. 4th cervical n. 5th cervical n. accessory n. auriculopalpebral n. cervical branch of the facial n. common carotid a. cranial thyroid v.



© 2019 Colorado State University

Q 🛱

Search

VIRTUAL CANINE ANATOMY Home Change Page - Alternate Views -



Larynx o, Supernolar Dissection Larynx 6: Superficial Dissection Larynx 7: Deep Dissection Larynx 8: Deep Dissection Larynx 9: Deep Dissection Larynx 10: Deep Dissection Larynx 11: Deep Dissection Larynx 12: Hyoid Apparatus Larynx 13: Laryngeal mm. Larynx 14: Laryngeal mm. Larynx 15: Midsagittal Larynx Larynx 16: Hyoid Bones, Laryngeal Cartilages



m. thyrohyoideus O: lamina of thyroid cartilage

I: thyrohyoid bone A: draw hyoid apparatus caudad N: hypoglossal n.

Search

Larynx 2: Superficial Dissection

- m. cleidomastoideus (cut) m. digastricus m. longissimus capitis m. longissimus cervicis m. longus capitis m. masseter m. mylohyoideus m. omotransversarius (cut) m. scalenus m. semispinalis capitis, m. complexus m. serratus ventralis m. sternocephalicus (cut) m. sternohyoideus
- m. sternothyroideus m. thyrohyoideus
- mm. intertransversarii

2nd cervical n. 3rd cervical n. 4th cervical n. 5th cervical n. accessory n. auriculopalpebral n. cervical branch of the facial n. common carotid a. cranial thyroid v.





© 2019 Colorado State University



m. thyrohyoideus

O: lamina of thyroid cartilage I: thyrohyoid bone A: draw hyoid apparatus caudad N: hypoglossal n.

Larynx 2: Superficial Dissection

- m. cleidomastoideus (cut)
- m. digastricus
- m. longissimus capitis
- m. longissimus cervicis

m. longus capitis

- m. masseter
- m. mylohyoideus
- m. omotransversarius (cut)
- m. scalenus
- m. semispinalis capitis, m.
- complexus
- m. serratus ventralis
- m. sternocephalicus (cut)
- m. sternohyoideus
- m. sternothyroideus
- m. thyrohyoideus

mm. intertransversarii

2nd cervical n. 3rd cervical n. 4th cervical n. 5th cervical n. accessory n. auriculopalpebral n. cervical branch of the facial n. common carotid a. cranial thyroid v.



© 2019 Colorado State University

Search

Q 🗘

Features students (and faculty) love...

- Quizzes
 - Here's a link to our exam/quiz questions with the VAA from 2019
 <u>https://drive.google.com/open?id=1NsivfUYpF5QCThK-</u>
 <u>MkO4Bm9mPXsrGpdo</u>
- "Next buttons"
- Search function
- Text description of features
- Zoom and rotate
- Dissection videos

The Future of Virtual Animal Anatomy

Video – too big for email

Thank you

