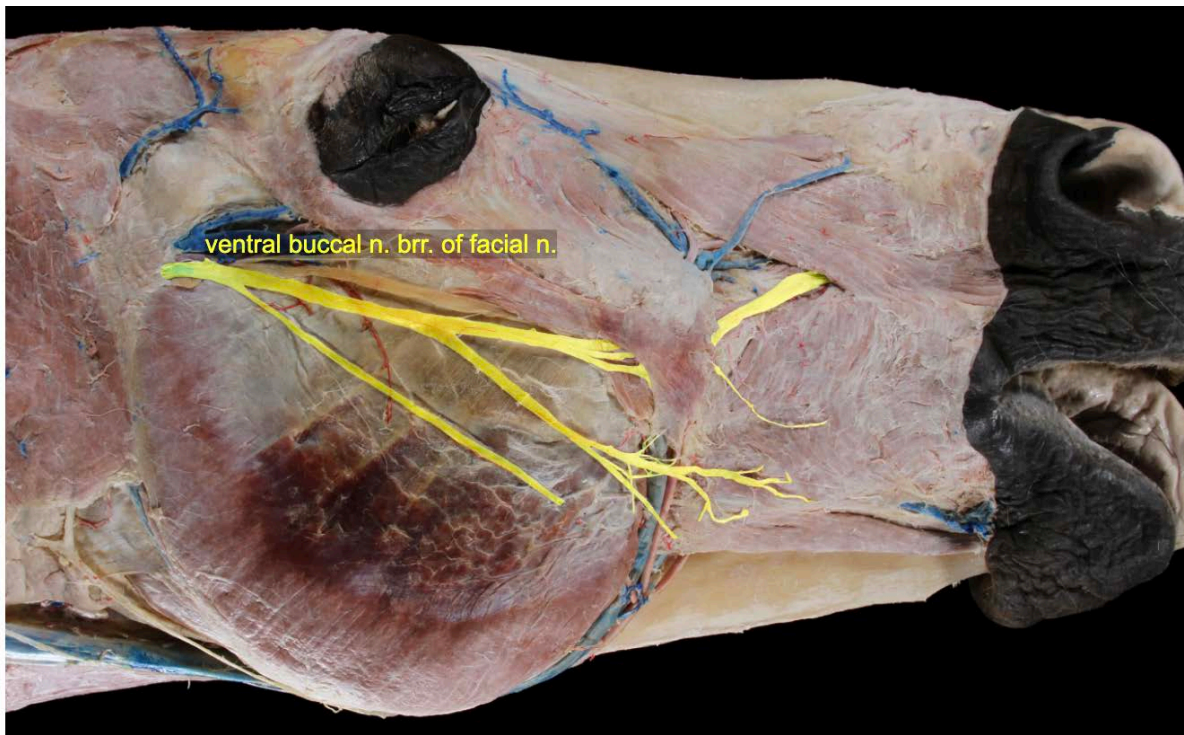


**Appendix 1. Section V.E. Domain 1b Evidence:
Virtual Equine Anatomy - Head and Pelvic Limb Modules**

In early 2012, I was asked by Dr. Ray Whalen (CSU University Distinguished Teaching Scholar and Professor in Biomedical Sciences) to assist with annotation of the equine thoracic limb for a virtual anatomy software atlas. At the time, I had just started teaching the cohort of anatomy courses in Biomedical Sciences (BMS) and had not yet fully grasped how important this virtual software was for student learning. Eight years later, and now Program Lead for the Virtual Veterinary Education Tools team that develops the Virtual Animal Anatomy software, I've embalmed, dissected, photo-captured, annotated, proofed, and produced several additional equine, feline, and bovine modules. Each module is an interactive resource that allows users to move layer by layer through a regional dissection with annotated and rotatable specimens. The equine head and pelvic limb modules are by far my favorite. Maybe it's because I'm still a horse vet at heart, or maybe it was the 2 students who worked with me on these modules who will forever be friends and colleagues, but I am especially proud of what we created. Below screen shots of the Virtual Equine Anatomy (VEA) program as a demonstration of the effort that has gone in to creating these enduring materials. The VEA horse was a stallion from the CSU Equine Reproduction Laboratory that I knew from my residency. Euthanised for a chronic lameness issue, I arranged his donation to VVET for this project.

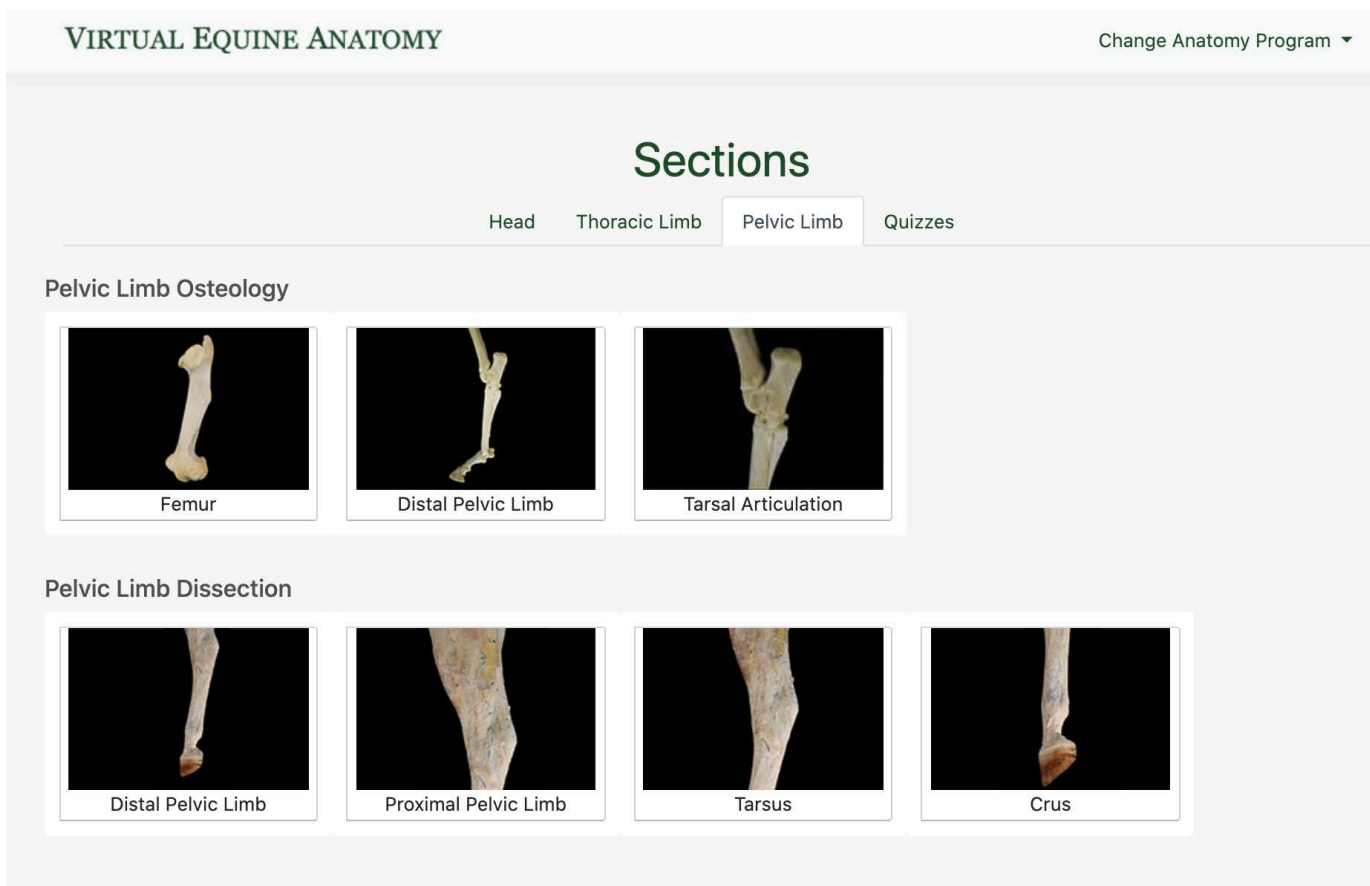
Figure 1. VEA: Ventral buccal nerve.



The VEA head unit was especially helpful for the Spring 2020 COVID-19 online transition. In addition to being a great anatomical resource, this particular image (Figure 1) is one that I use frequently for mentoring. Students mistakenly think that their faculty are perfect and have never make a mistake. I think it's only a mistake if you don't learn from it. Whenever a student accidentally cuts or damages an anatomical structure, I show them this image and ask them to find the branch of the ventral buccal nerve that I cut off during dissection and had to recreate from fascia and glue on before we photographed. Overall, the embalming and dissection in the VEA is exceptional. The lesson to be learned is that the anatomy lab is where errors can be made and safe failure can occur.

The VEA pelvic limb unit was very challenging because we could not capture each layer of the pelvic limb dissection in a single photography session. For photography, anatomical specimens are placed on a 360-degree mechanically driven rotating table that is linked to a camera on a boom arm. The boom moves up/down 40-degrees, creating a 80 x 360 degree image cloud of the object to then create a QuickTime VR (QTVR) image. Each image set takes approximately 3 hours, with lighting that must be carefully managed to not create shadows as the camera angle is moved. As shown in **Figure 2** each dissection layer of VEA Pelvic Limb required 4 different photography sessions (Distal Pelvic Limb, Proximal Pelvic Limb, Tarsus, Crus). Unique to the VEA among anatomy software programs is our use of real anatomical specimens and interactive photo-realistic images. VEA users also have access to the Head and Thoracic Limb sections, as well as quizzes embedded in the program. At any time, users can switch to another species ("Change Anatomy Program") or bring up another browser window with another species for comparative anatomy.

Figure 2. VEA: Pelvic Limb Dissection sections



The VEA pelvic limb images, once annotated with overlays and the addition of text, are exceptionally useful for anatomical teaching and clinical practice. The tendon of the superficial digital flexor muscle (**Figure 3**) is a common site of injury in the horse and the dorsal metatarsal artery of III (**Figure 4**) is a sampling site for a blood-gas analysis sample from a foal. Each dissection image indicates the region, layer and view, with a list of anatomical structures on the right side of the page. Selected structures are highlighted and text provides information about the structure. From the "Alternate Views" tab, the user can select another view of the specimen, or rotate the QTVR as a 3-dimensional representation of the object. Using stereophotogrammetry, my team is now turning QTVR images in to true VR objects for the next generation of Virtual Animal Anatomy: <http://www.cvmb.colostate.edu/vetneuro/VR.html>

Figure 3. VEA: Distal Pelvic Limb 2: Lateral View - superficial digital flexor m.



Distal Pelvic Limb 2: Lateral View

- m. extensor digitorum brevis*
- m. extensor digitorum lateralis*
- m. extensor digitorum longus*
- m. flexor digitorum profundus*
- m. flexor digitorum profundus, caput laterale*
- m. flexor digitorum superficialis***
- m. peroneus tertius*
- m. tibialis cranialis*
- suspensory ligament
 - extensor branch
 - extensor slip
 - interosseous proper

- caudal cutaneous tibial n.
- caudal femoral a.
- communicating plantar v.
- dorsal br. of the lateral digital v.
- dorsal br. of the lateral plantar digital n.
- dorsal metatarsal a. III
- lateral coronalis vv.
- lateral digital a.
- lateral digital v.
- lateral metatarsal n.
- lateral plantar digital n.

m. flexor digitorum superficialis

The superficial digital flexor muscle belly is largely replaced by tendon and is found deep to the medial and lateral heads of the gastrocnemius muscle. The tendon of the superficial digital flexor will turn along the medial aspect of the gastrocnemius tendon to reach a superficial position by the tuber calcanei. As the tendon nears its point of termination, on the proximal and middle phalanges, it divides into two limbs with the tendon of the deep digital flexor coursing between them.

O: Femur, supracondylar fossa

I: Tuber calcanei and the distal part of the proximal phalanx and proximal part of the middle phalanx

N: Tibial nerve



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Figure 4. VEA: Tarsus 4: Lateral View - dorsal metatarsal a. III



Tarsus 4: Lateral View

- common calcaneal tendon
- m. extensor digitorum brevis*
- m. extensor digitorum lateralis*
- m. extensor digitorum longus*
- m. flexor digitorum profundus*
- m. flexor digitorum profundus, caput laterale*
- m. flexor digitorum superficialis*

- caudal cutaneous tibial n.
- caudal femoral a.
- cranial tibial a.
- cranial tibial v.
- dorsal metatarsal a. III**
- dorsal metatarsal n. III
- dorsal pedal v.
- lateral plantar n.
- lateral plantar v.
- lateral saphenous v.
- superficial fibular n.

- calcaneus
- metatarsal III
- metatarsal IV
- talus

dorsal metatarsal a. III (great metatarsal a.)

Dorsal metatarsal artery III is located between metatarsals III and IV (cannon bone and lateral splint bone). Near the distal extent of metatarsal IV dorsal metatarsal artery III will pass to the plantar surface as the distal perforating branch.



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