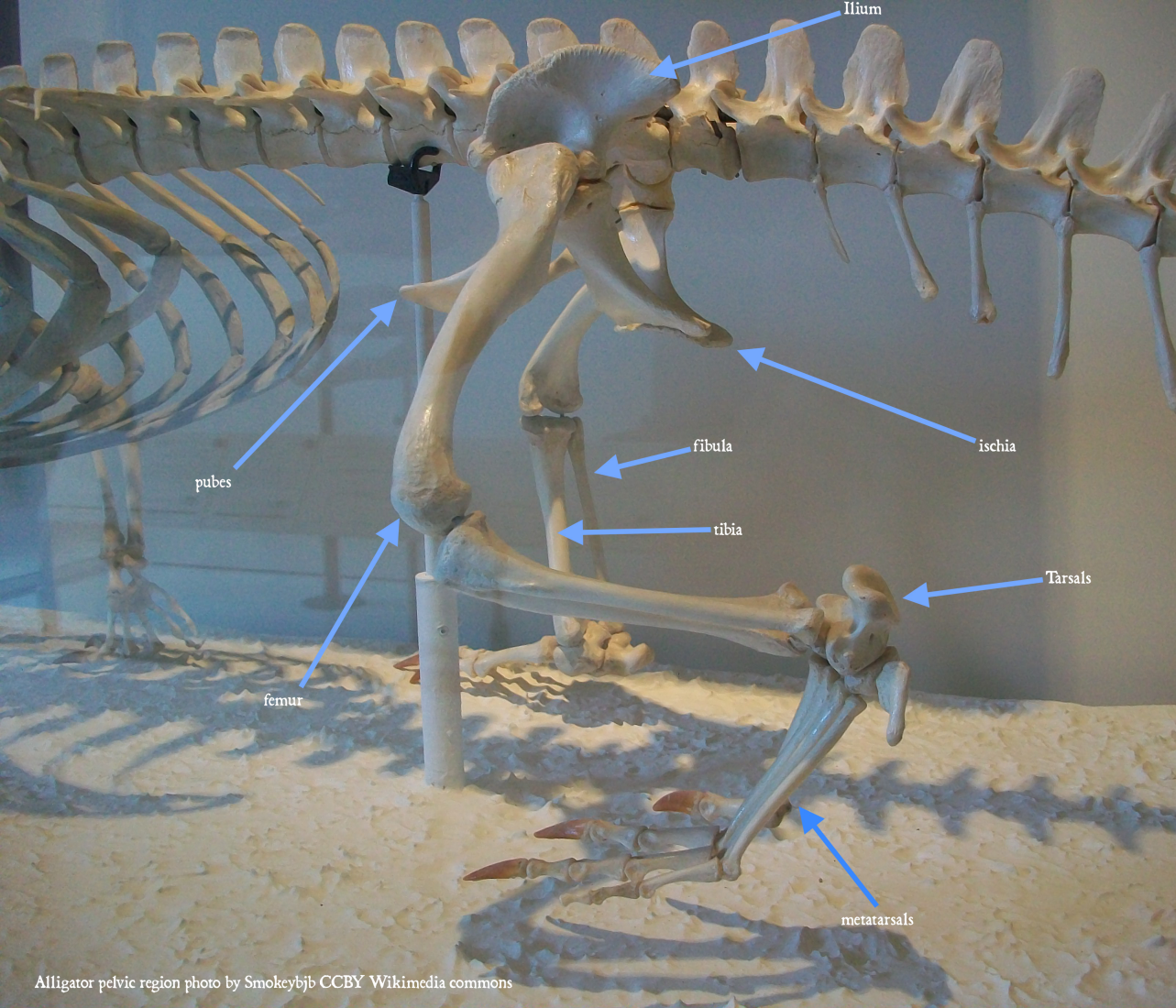


1. Skull
2. Lower jaw or mandible
3. Shoulder bone
4. Phalanges of the hand
5. Carpus
6. Ulna
7. Radius
8. Humerus
9. Ribs
10. Femur or thigh bone
11. Fibula
12. Metatarsus
13. Tarsus or ankle bone
14. Tibia

- * A : Cervical vertebrae (neck)
- * B : Thoracic vertebrae (dorsal)
- * C : Lumbar vertebrae (lumbar region)
- * D : Sacrum (pelvic cavity)
- * E : Caudal vertebrae (tail)



Ilium

ischia

fibula

pubes

tibia

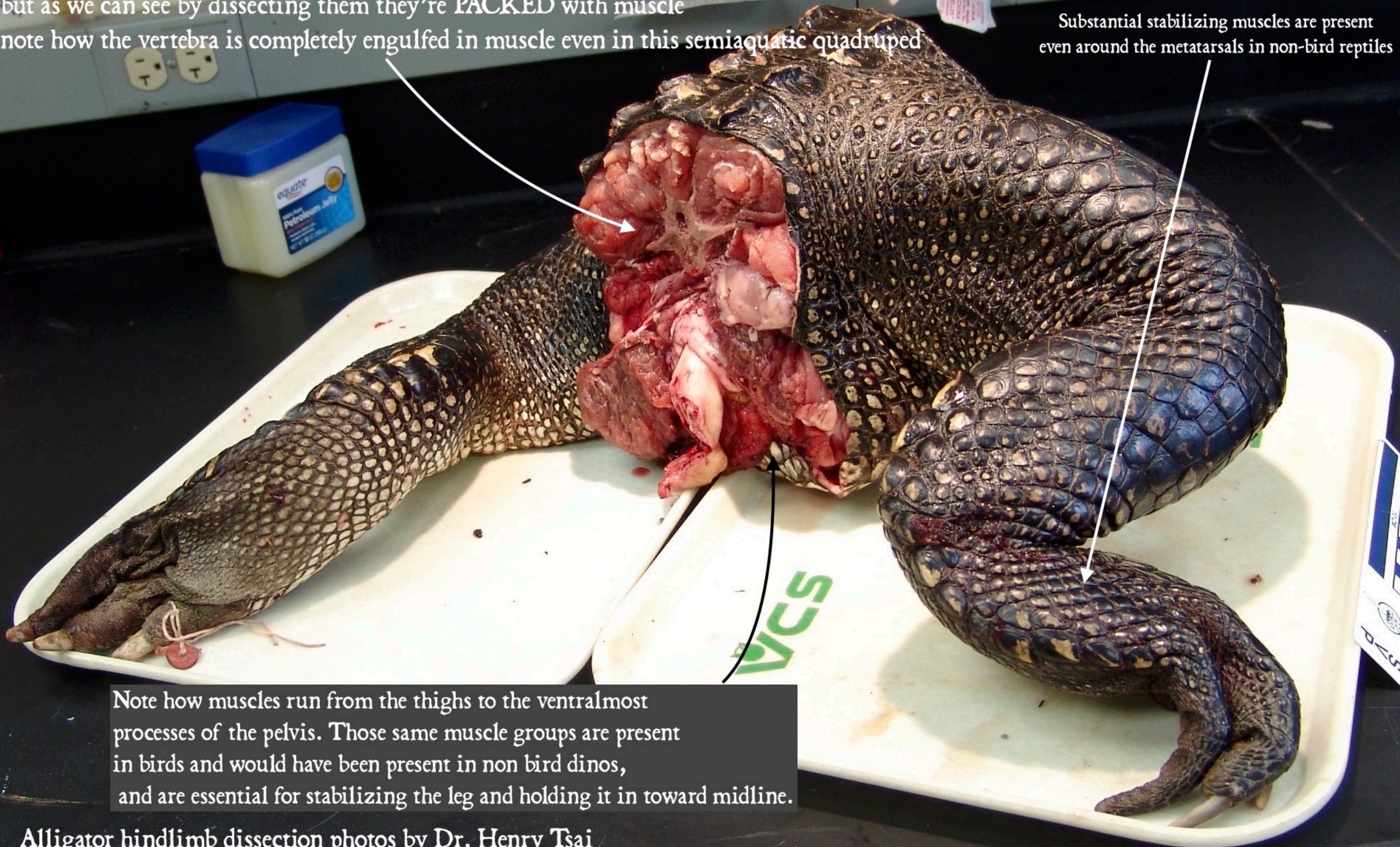
Tarsals

femur

metatarsals

The haunches and hindlimbs of crocodylians and birds look **CHUNKY**, but as we can see by dissecting them they're **PACKED** with muscle note how the vertebra is completely engulfed in muscle even in this semiaquatic quadruped

Substantial stabilizing muscles are present even around the metatarsals in non-bird reptiles



Note how muscles run from the thighs to the ventralmost processes of the pelvis. Those same muscle groups are present in birds and would have been present in non bird dinos, and are essential for stabilizing the leg and holding it in toward midline.

Alligator hindlimb dissection photos by Dr. Henry Tsai
University of Missouri Vert Paleo lab / Dr. Casey Holliday @CrocHolliday

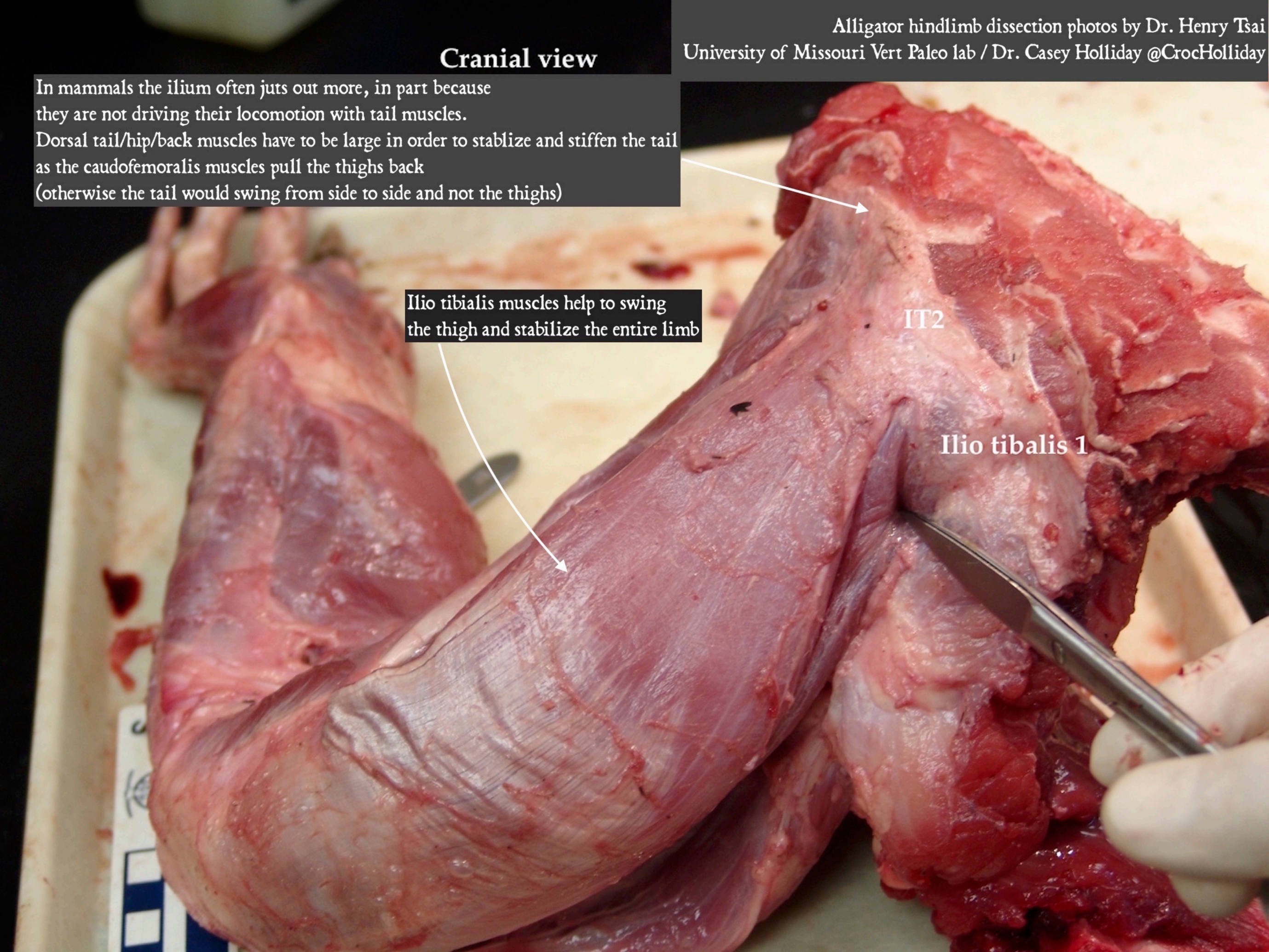
Cranial view

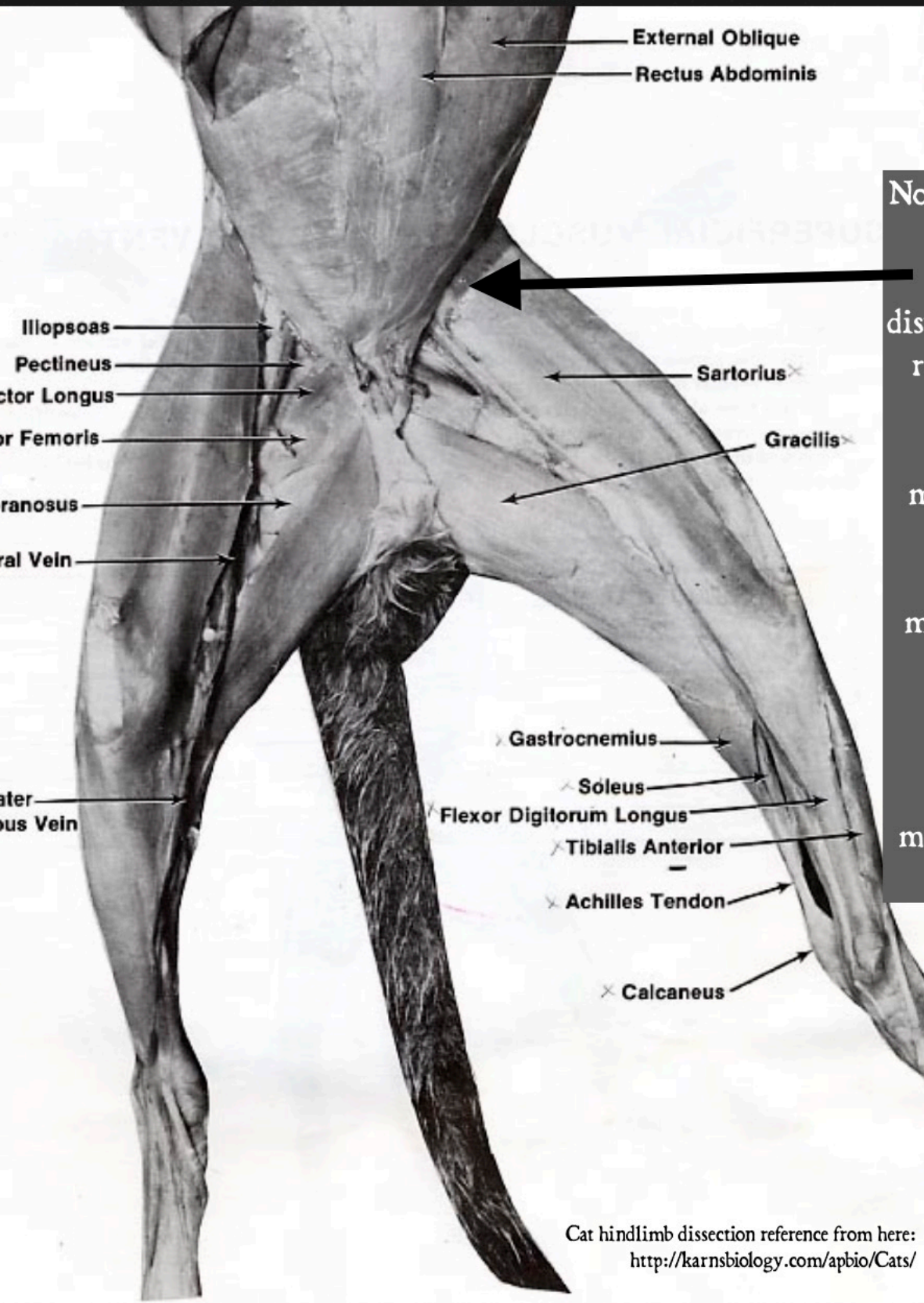
In mammals the ilium often juts out more, in part because they are not driving their locomotion with tail muscles. Dorsal tail/hip/back muscles have to be large in order to stabilize and stiffen the tail as the caudofemoralis muscles pull the thighs back (otherwise the tail would swing from side to side and not the thighs)

Ilio tibialis muscles help to swing the thigh and stabilize the entire limb

IT2

Ilio tibialis 1



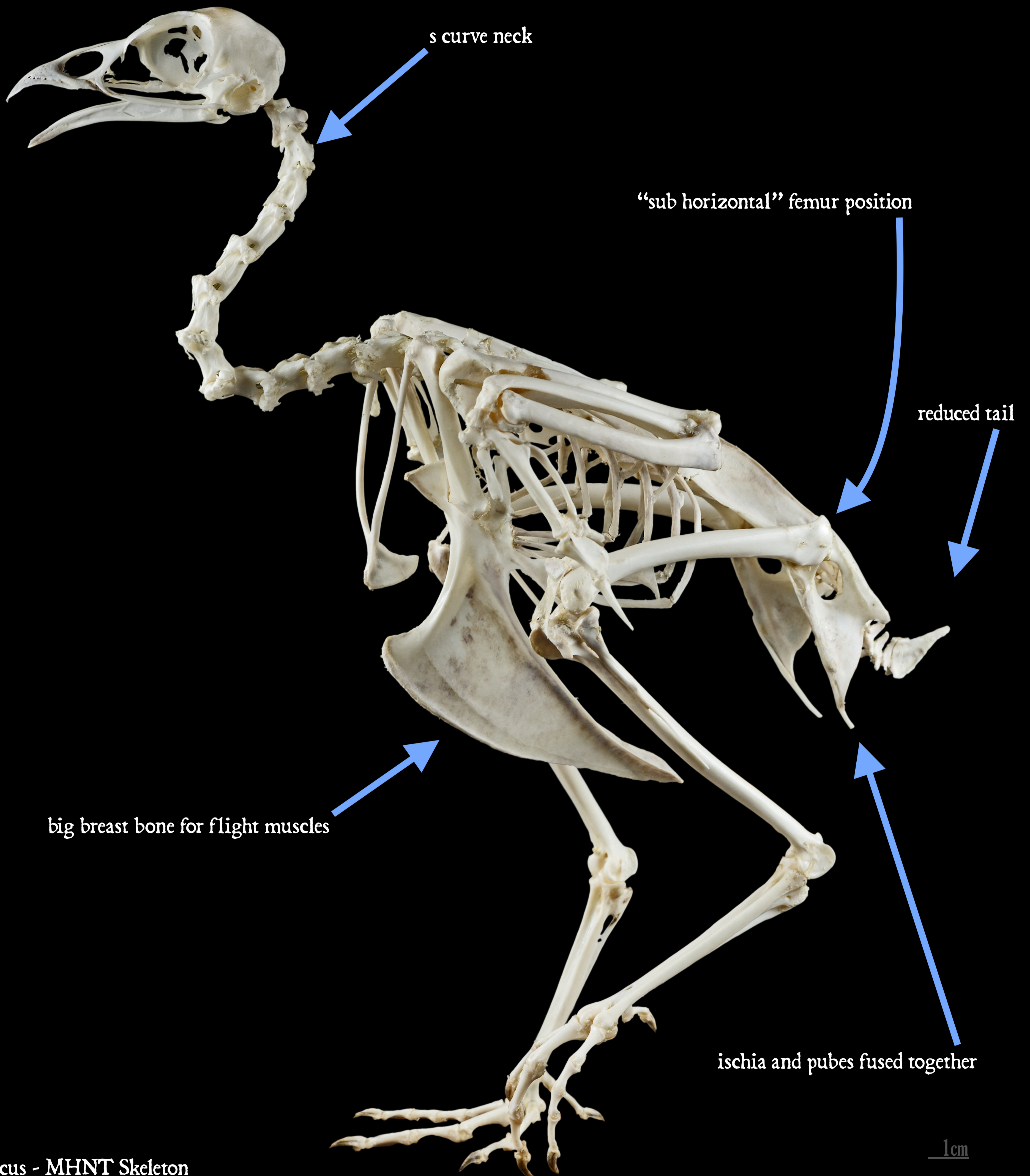


note how large leg muscles connect along the entire ventral surface of the pelvis, which is as deep as the rest of the torso.

Note how in the mammal the pelvis is not as deep as the rest of the torso giving the stomach a "scooped in" look. Many mammals achieve distal limb stabilization with long/strong tendons running into the feet, instead of muscles. Only non-bird theropods and ornithopods appear to have accomplished something similar by migrating much of their hindlimb musculature proximal to the body/pelvis, but they still stabilize those hindlimbs with deep, heavily muscled pelvises & tails. Quadrupedal dinosaurs maintained significant muscle attachment surfaces on the bones of the distal hind limbs, suggesting that they were stabilizing and contracting their hind limbs with lots of musculature somewhat more like crocs than most mammals

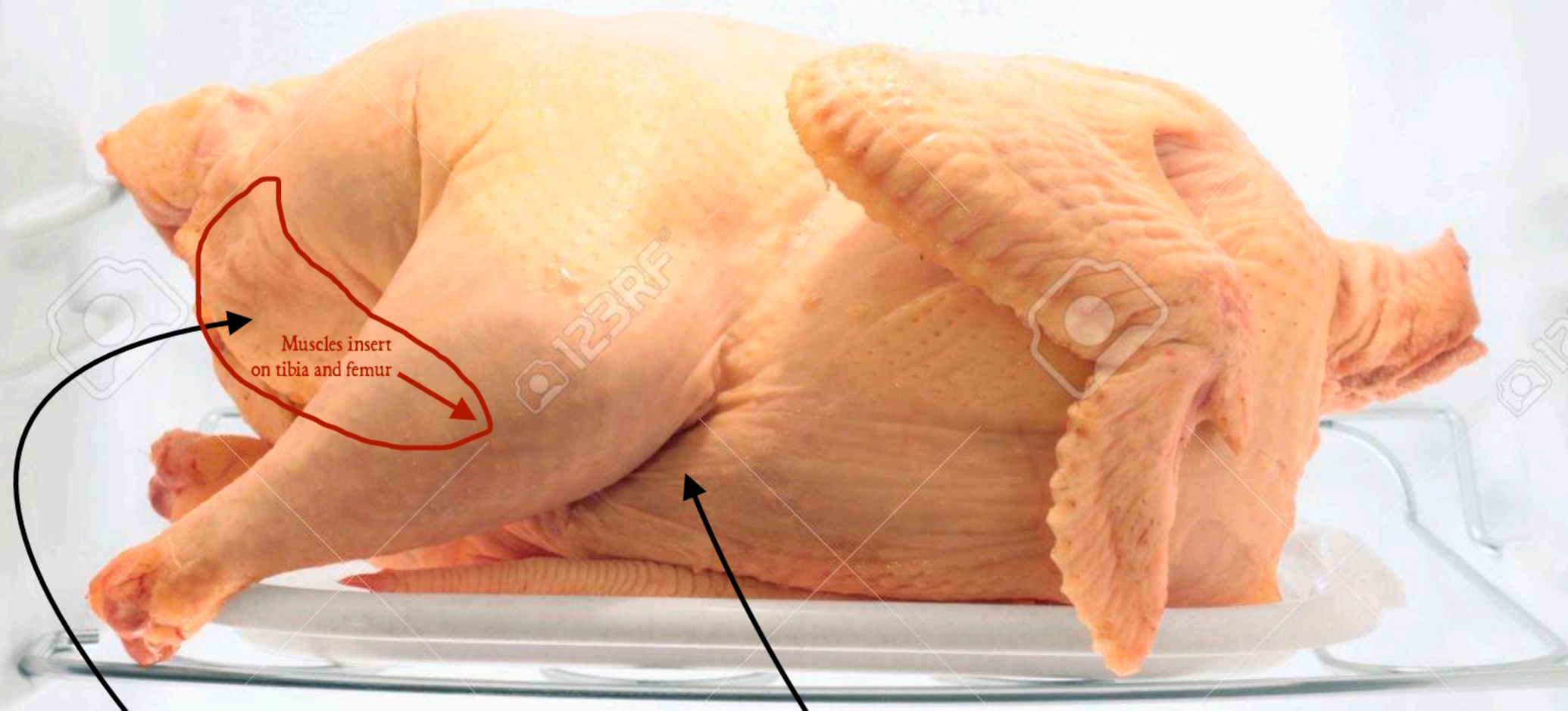
VENTRAL VIEW (belly UP)





Phasianus colchicus - MHNT Skeleton
photo by Didier Descouens - CC BY wikimedia commons

This is how muscular the legs /hips/back of a relatively **TINY**, mostly ground dwelling bipedal theropod are



Muscles insert on tibia and femur

Ischio tibialis muscle group pulling the thigh toward midline.

In more basal non-bird theropods the large pubic bones would have been here instead of the enlarge breast bone/musculature for flight. That more cranial position allowed for a more vertical hip posture, and large muscles would have attached from from the pubes to the femur and tibia. See Hutchinson et al, "The evolutionary continuum of limb function from early theropods to birds"

SCIENCE
APPROVED!

DINO BUTTS PAST & PRESENT

dontmesswithdinosaurs.com

60s-70s



"We'll make this antideluvian swamp lizard thing work somehow."

Pot-bellied leggy-lizards

80s-90s
(and contemporary pop culture)



Every bone protruding
Thighs weirdly separate from body

"We're comfortable with thigh muscles. That is all."

Bird-hipped scale-mummies

2000s



"Look away children. Nature is drunk, sloppy, and utterly terrifying."

Thicc-tailed monster-turkeys