

Natural Sciences 360

Legacy of Life

Lecture 17

Dr. Stuart S. Sumida

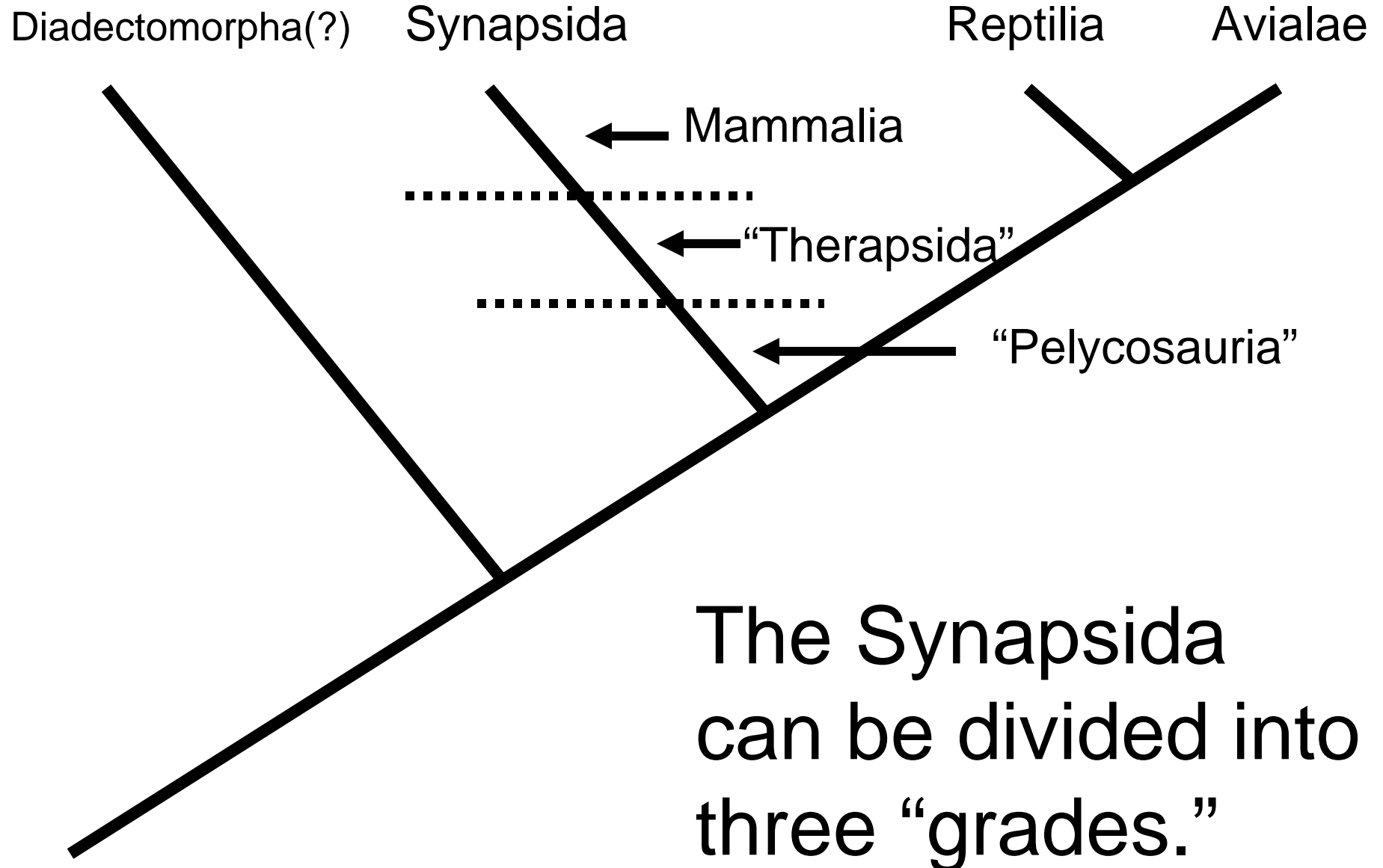
Mammals

(You are what you eat)

Synapsida: Including Modern Mammals

(You are what you eat)

AMNIOTA



Mammals:

- Mammary glands
- Hair
- Facial muscles – muscles of facial expression
- A specialized jaw joint (between a single bone of the lower jaw (dentary) and the squamosal region of the skull)
- Three bones in the middle ear to help in hearing

Mammals have mammary glands for NOURISHING THE YOUNG



Mammals have HAIR.

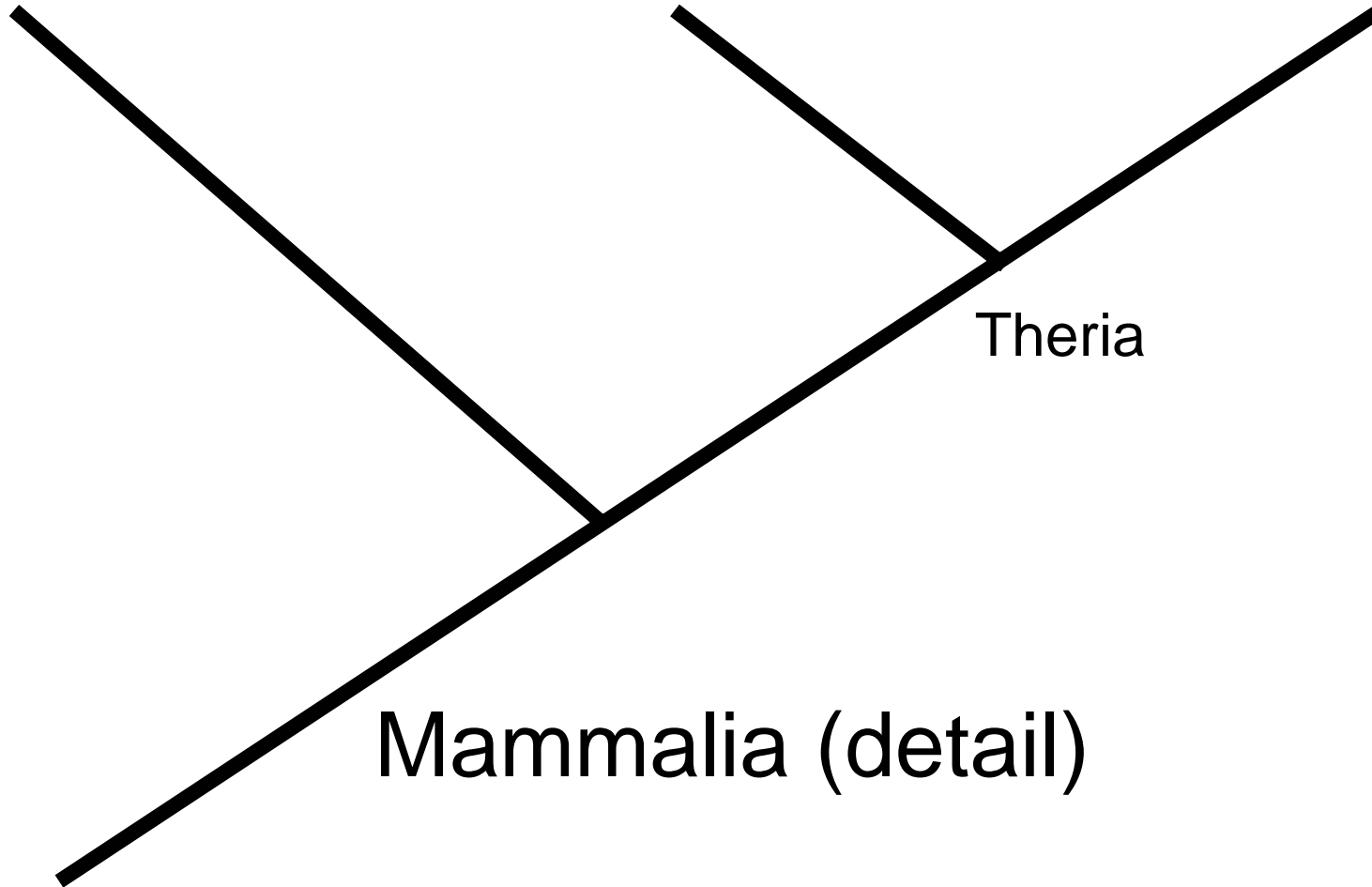
Mammals have muscles of facial expression



Monotremata
(Egg-laying mammals)

Metatheria
(Marsupials)

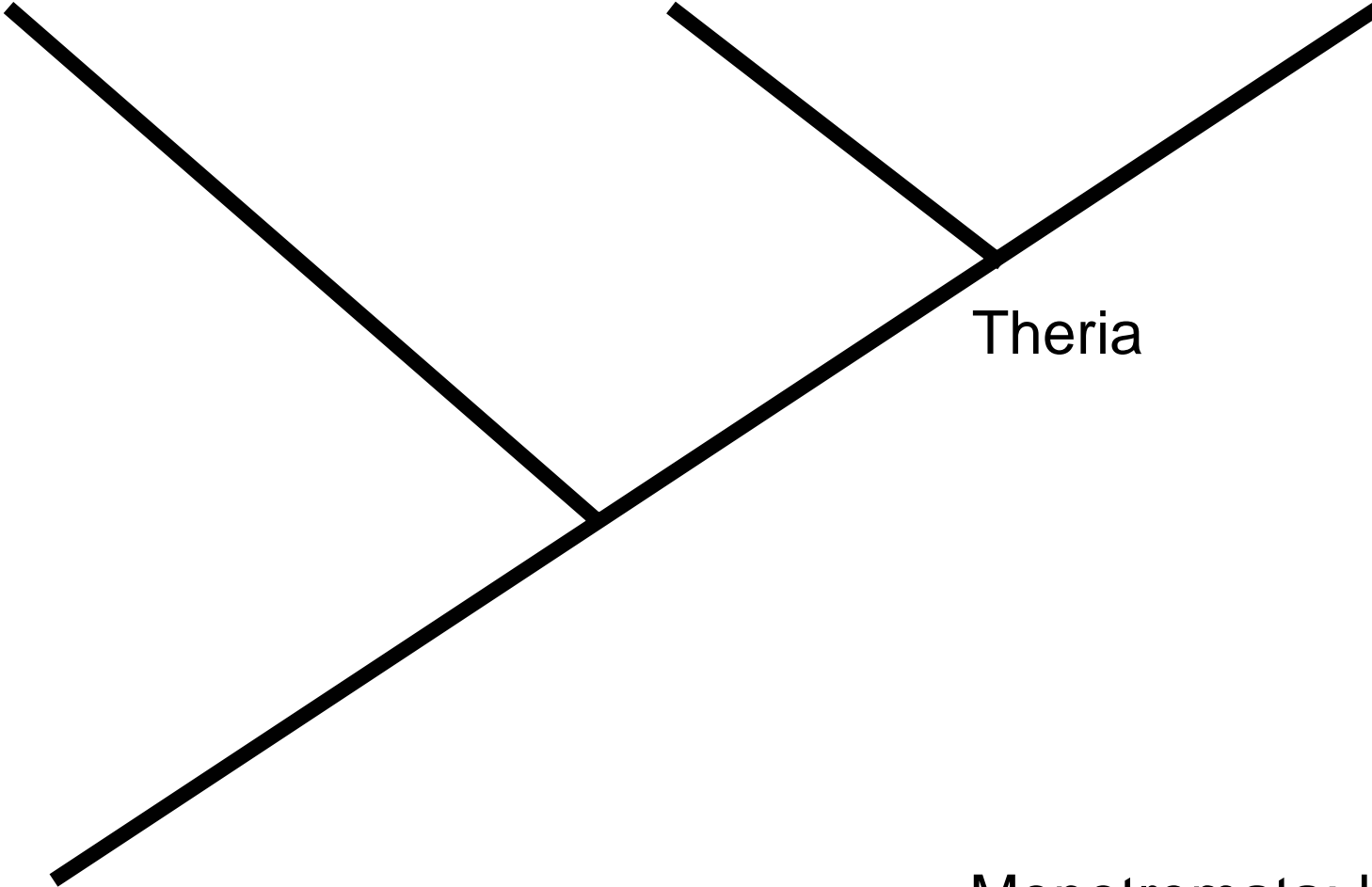
Eutheria
(Placental Mammals)



Monotremata
(Egg-laying mammals)

Metatheria
(Marsupials)

Eutheria
(Placental Mammals)



Monotremata: known
since the Cretaceous

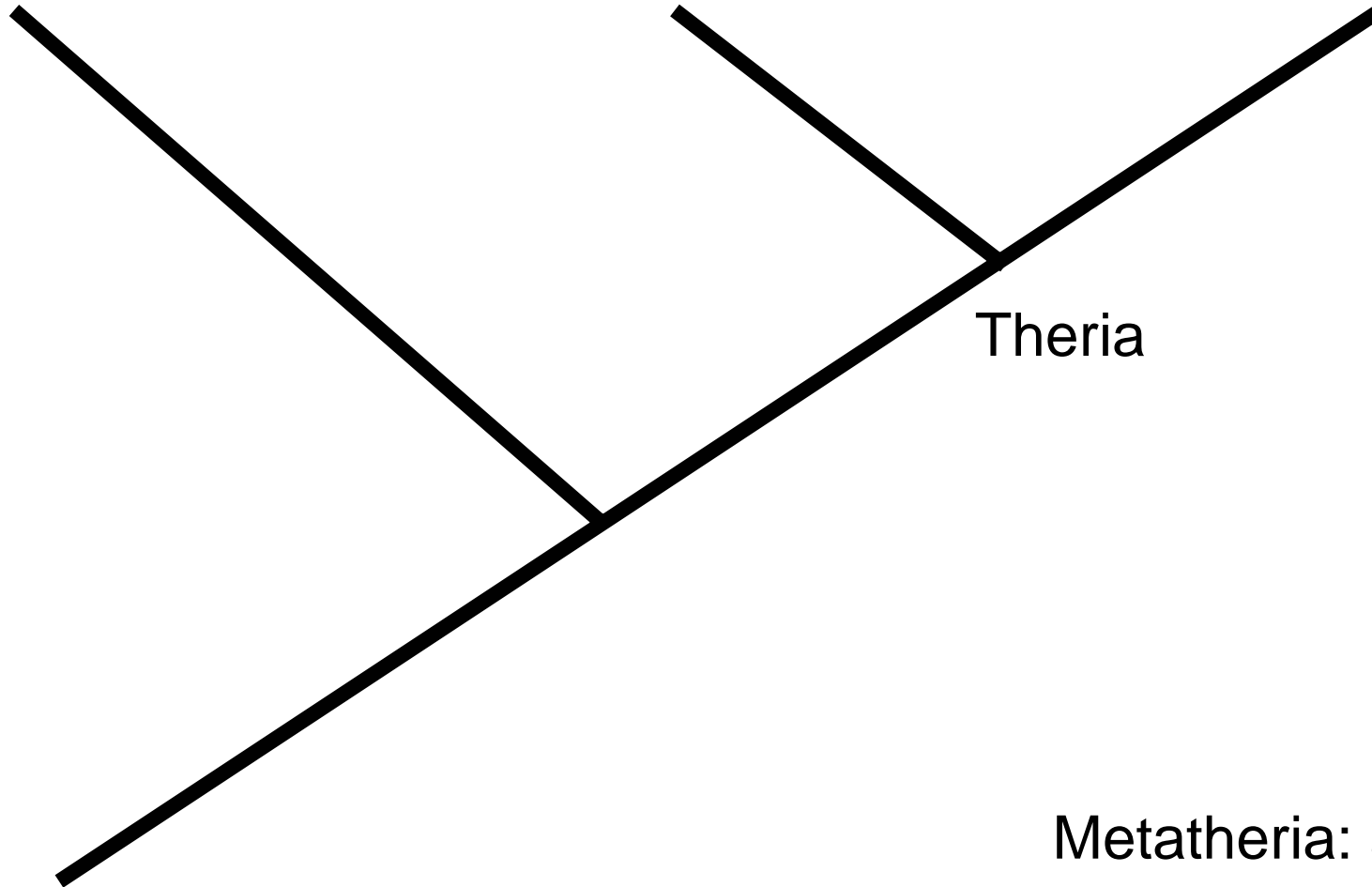
The duck-billed platypus and spiny anteater (*Echidna*) are members of Monotremata (egg-laying mammals).



Monotremata
(Egg-laying mammals)

Metatheria
(Marsupials)

Eutheria
(Placental Mammals)



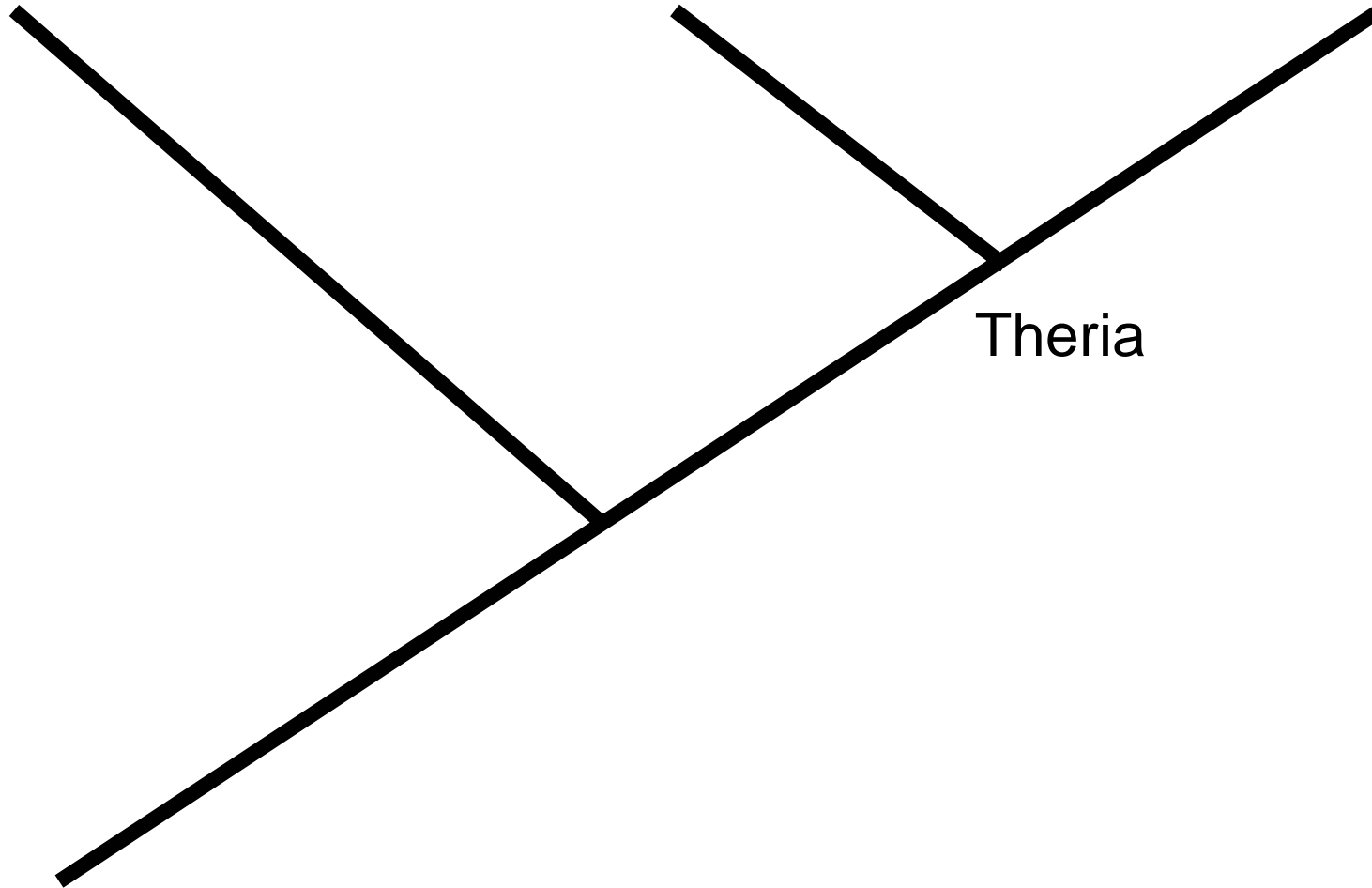
Theria

Metatheria: also
known since the
Cretaceous

Monotremata
(Egg-laying mammals)

Metatheria
(Marsupials)

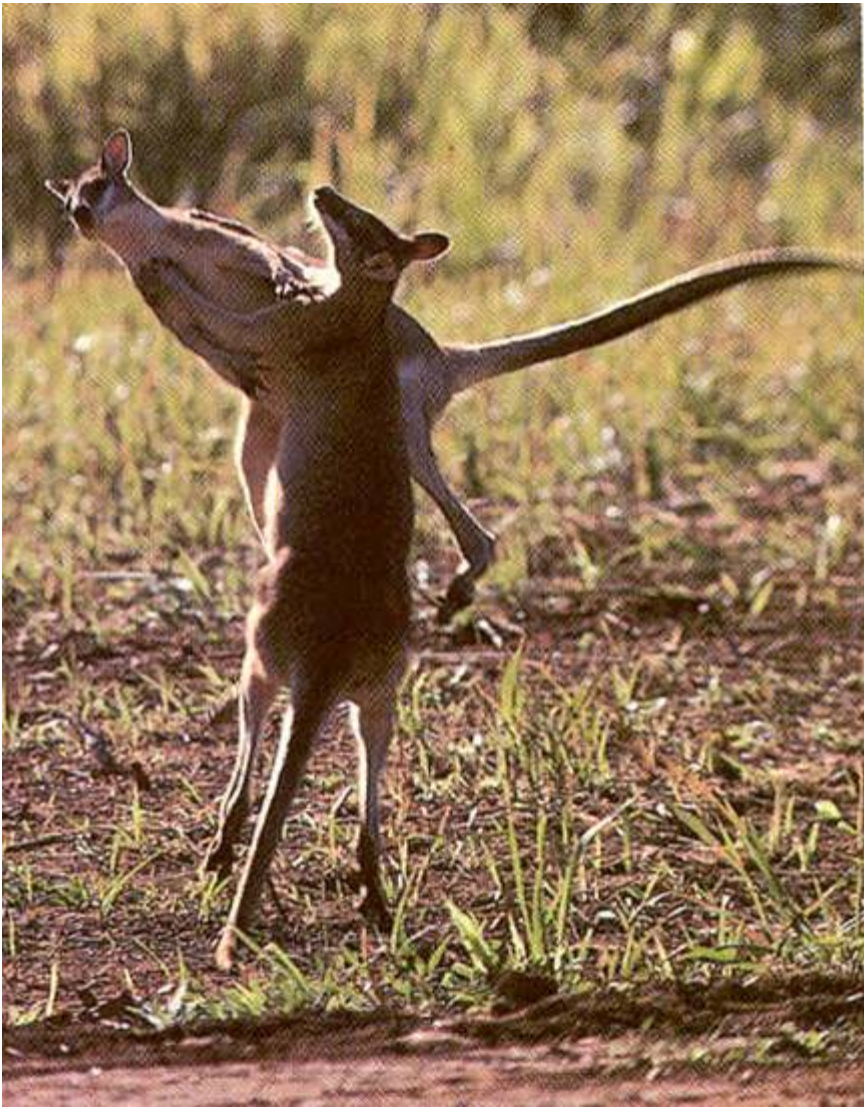
Eutheria
(Placental Mammals)



The METATHERIA, also known as MARSUPIALS are often called the “pouch mammals” because although initial development is internal, much takes place in the mother’s pouch – which is technically outside the body.

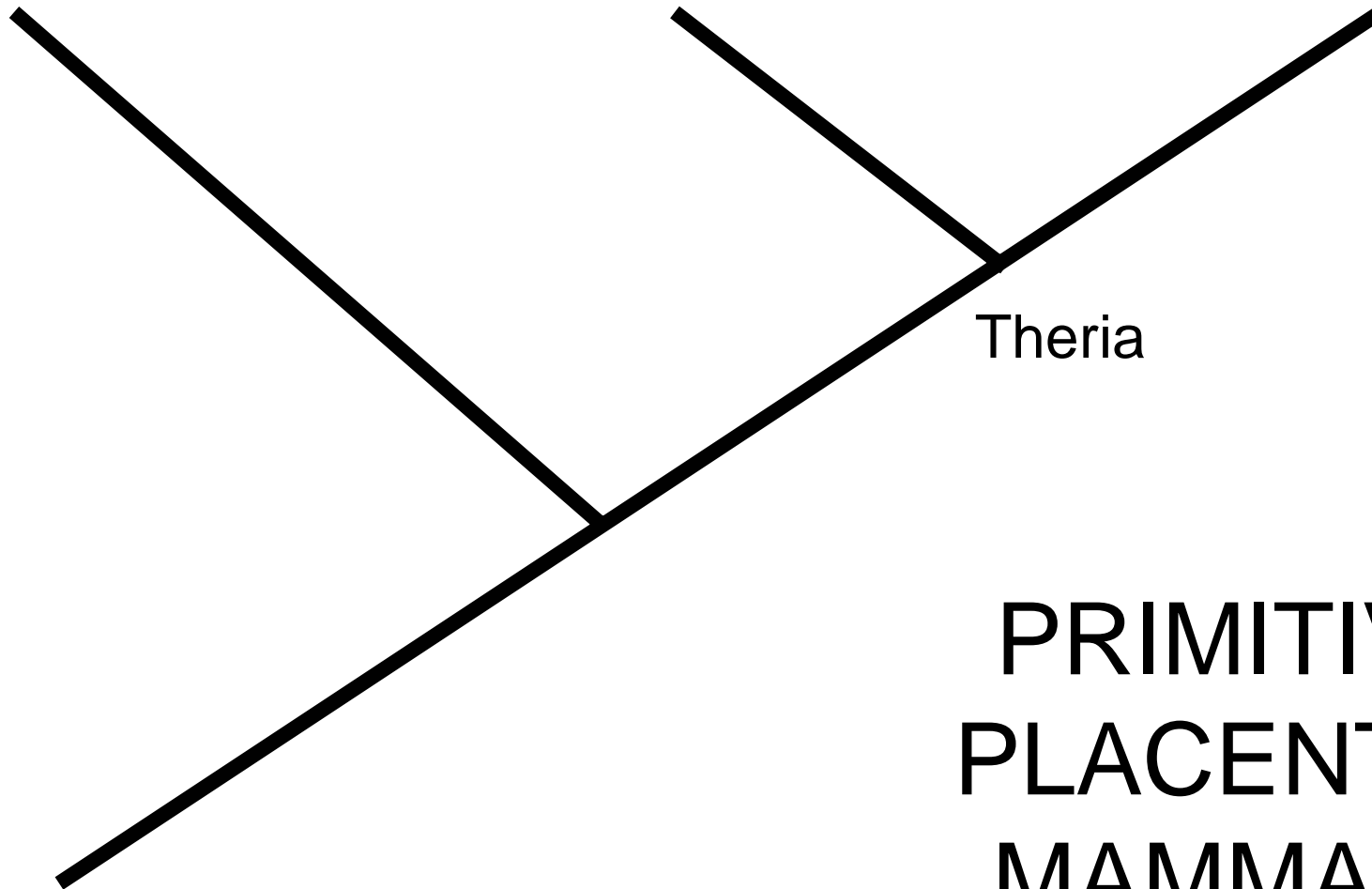






Kangaroos can be almost orthograde

Eutheria
(Placental Mammals)



Theria

PRIMITIVE
PLACENTAL
MAMMALS

A Placenta:

- Combination of the amniote Chorion and Allantois
- Helps the developing embryo to communicate with mother.

PRIMITIVE PLACENTAL MAMMALS



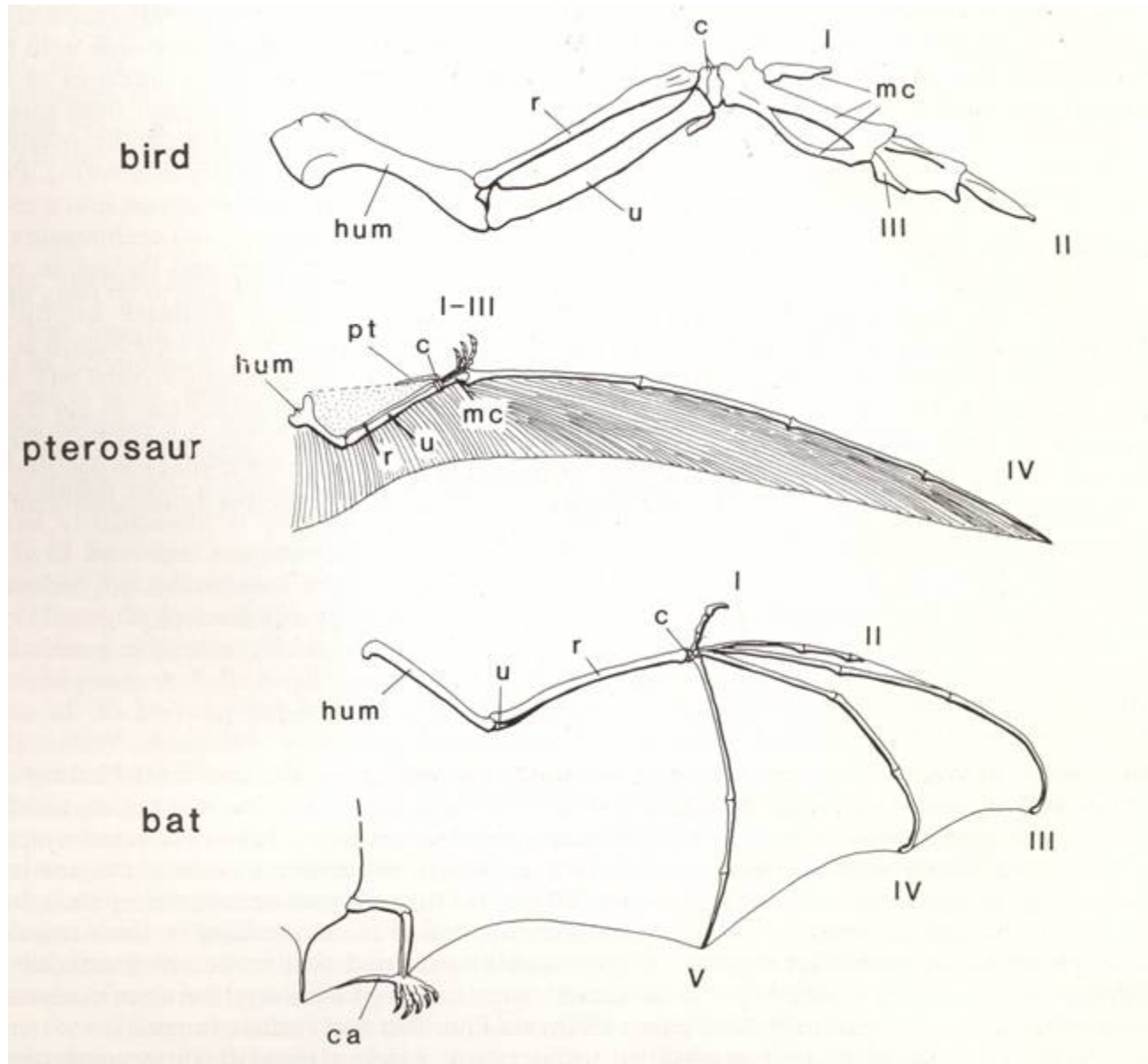
The most primitive living mammals are called insectivores.



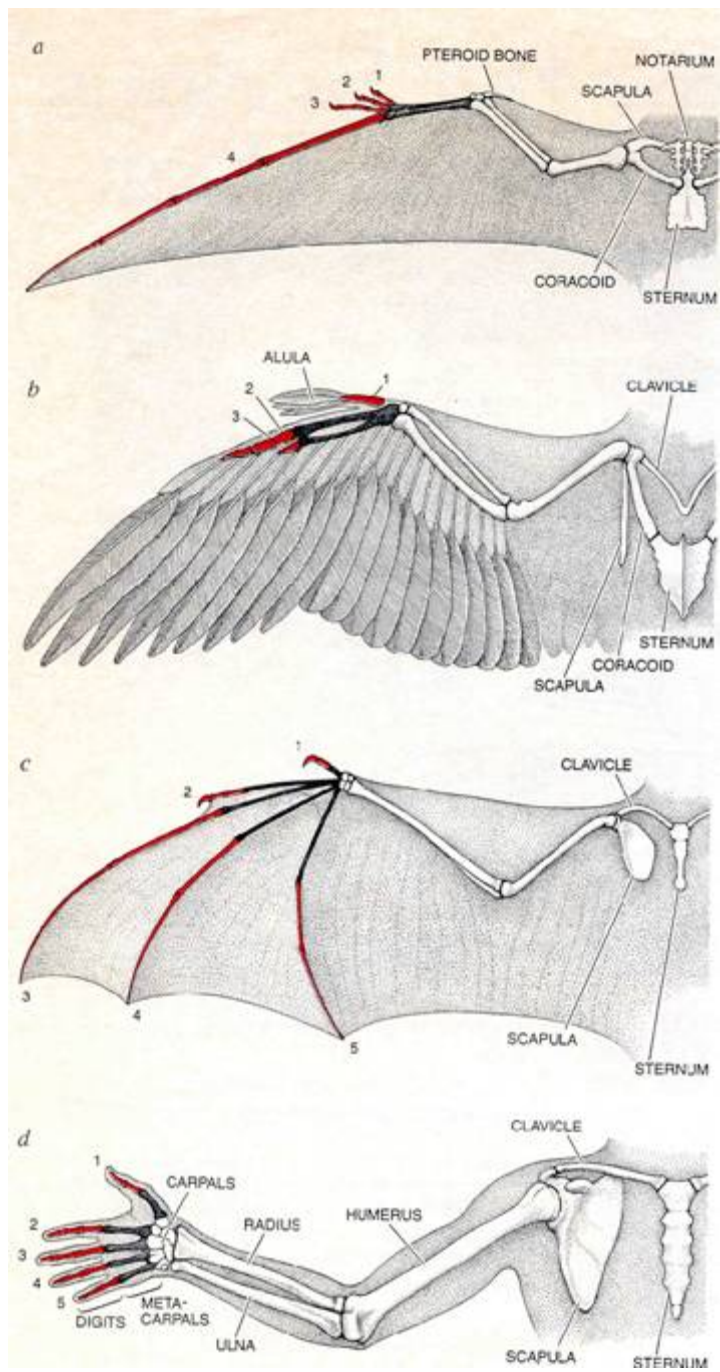


Amongst the most primitive lineages of mammals:

- Insectivores
- Bats
- Primates (We'll talk about them later.)



Comparative wing structure in flying vertebrates









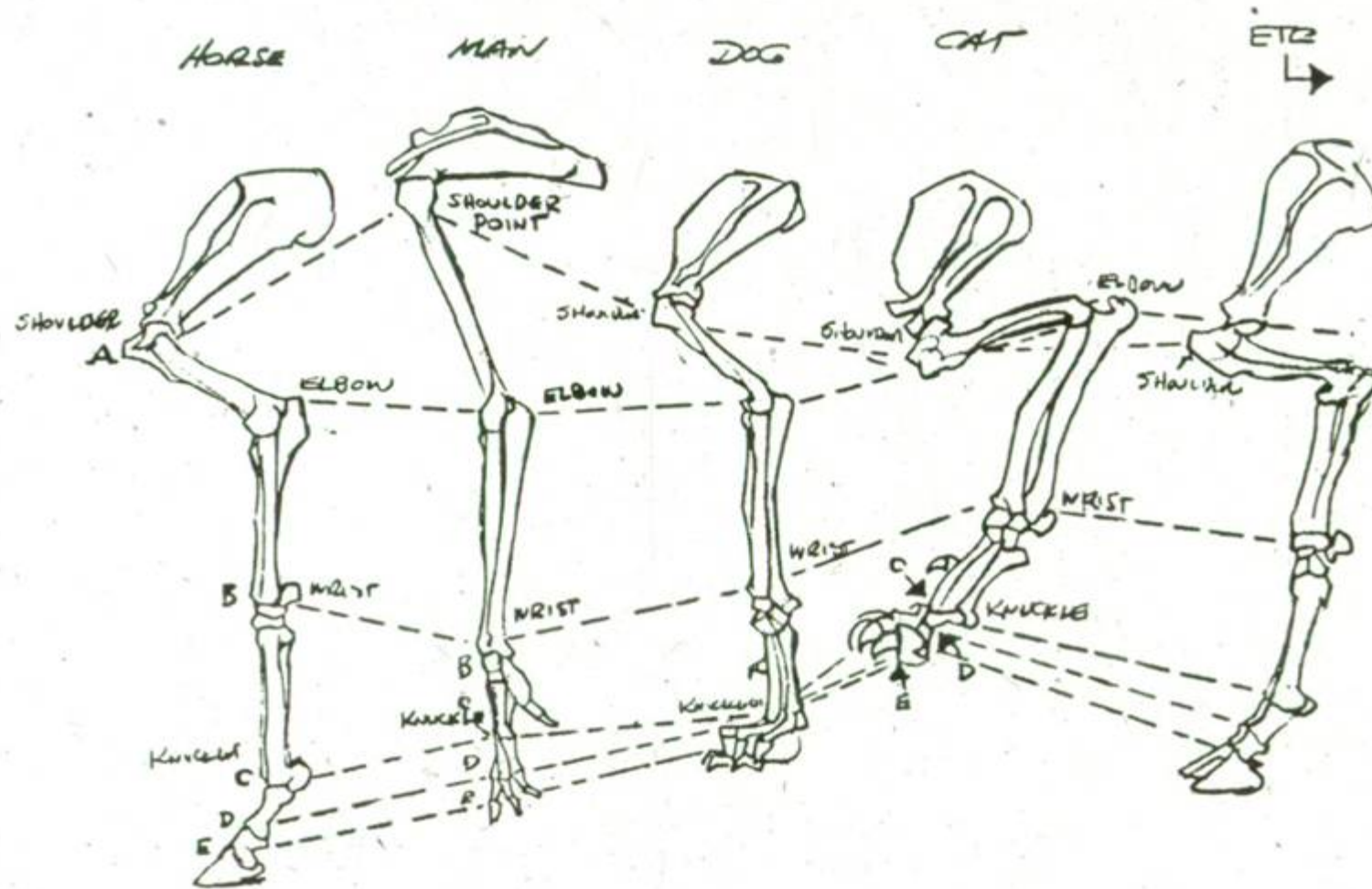


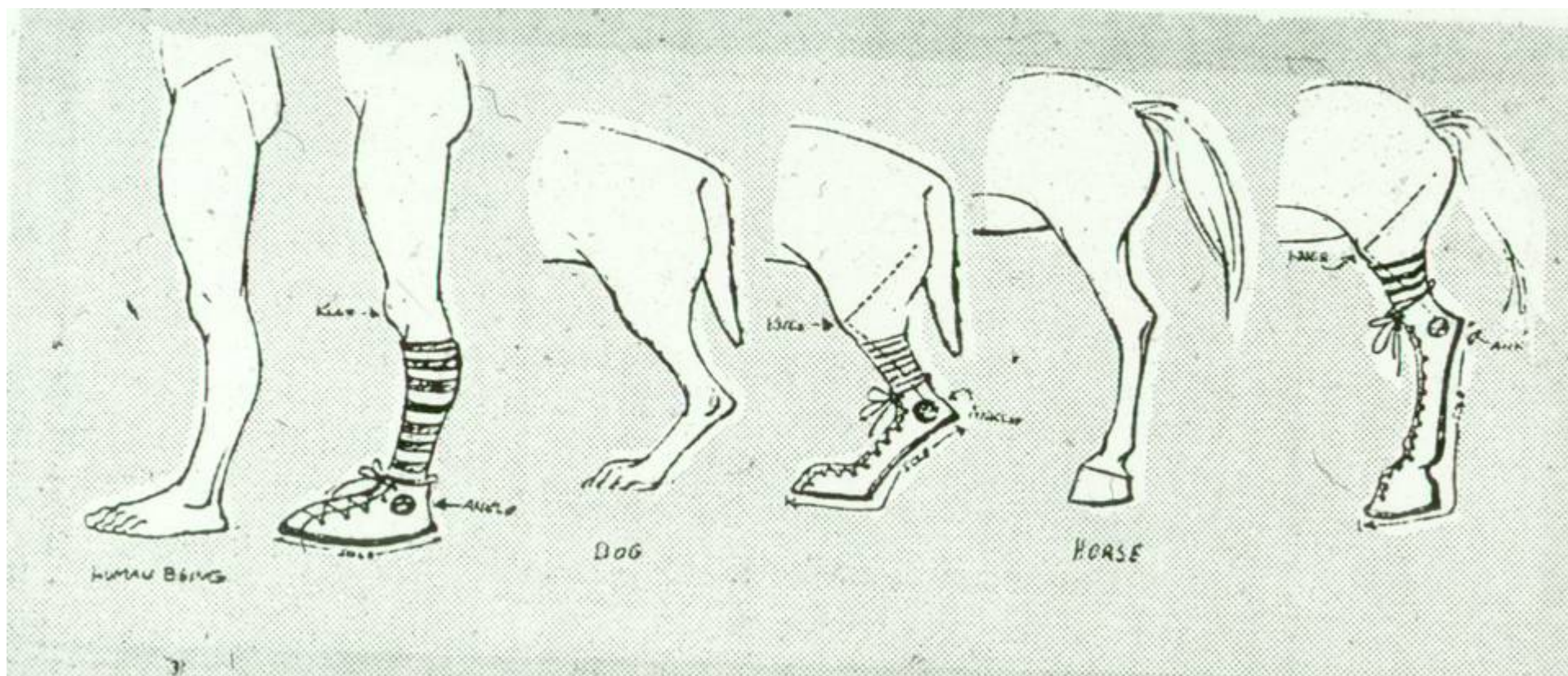
More derived placental mammals:

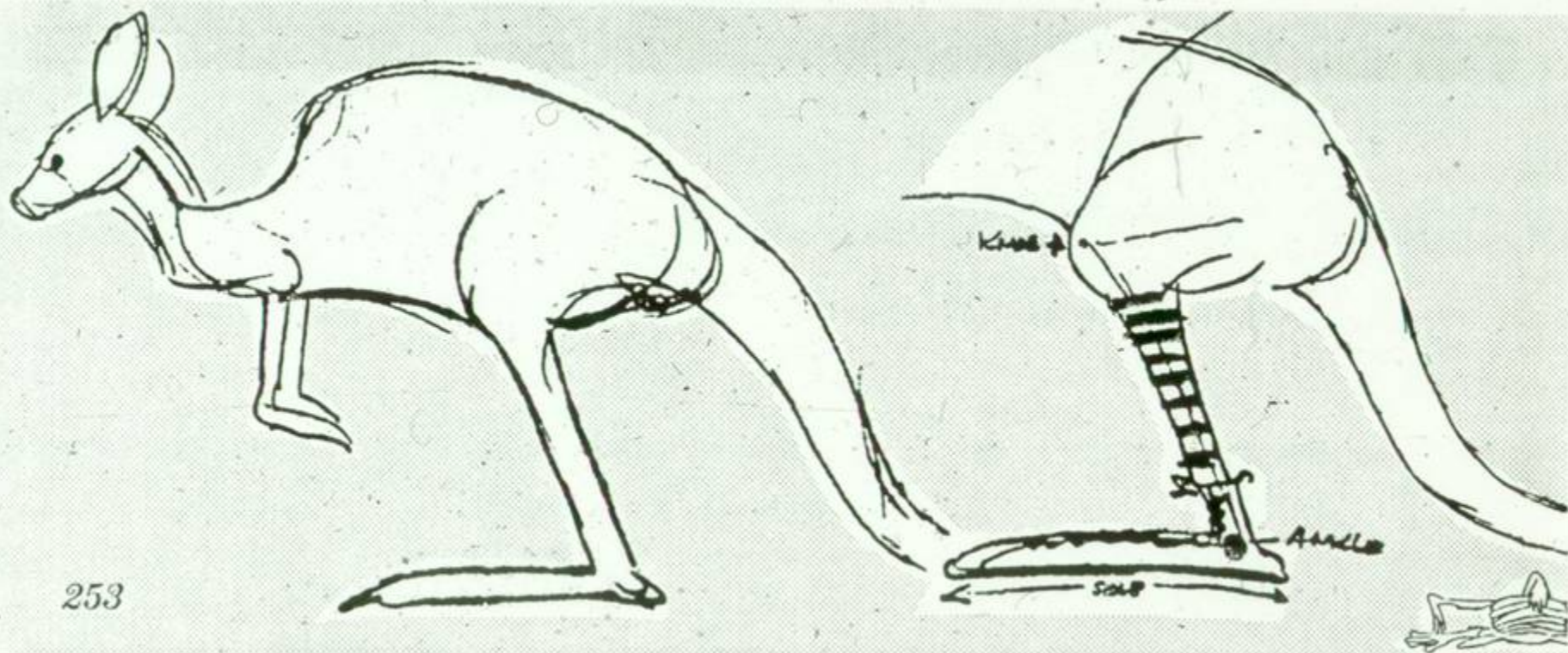
- Many groups.
- Body shape and function is very much determined by diet.

Animation, Mammals, and Science

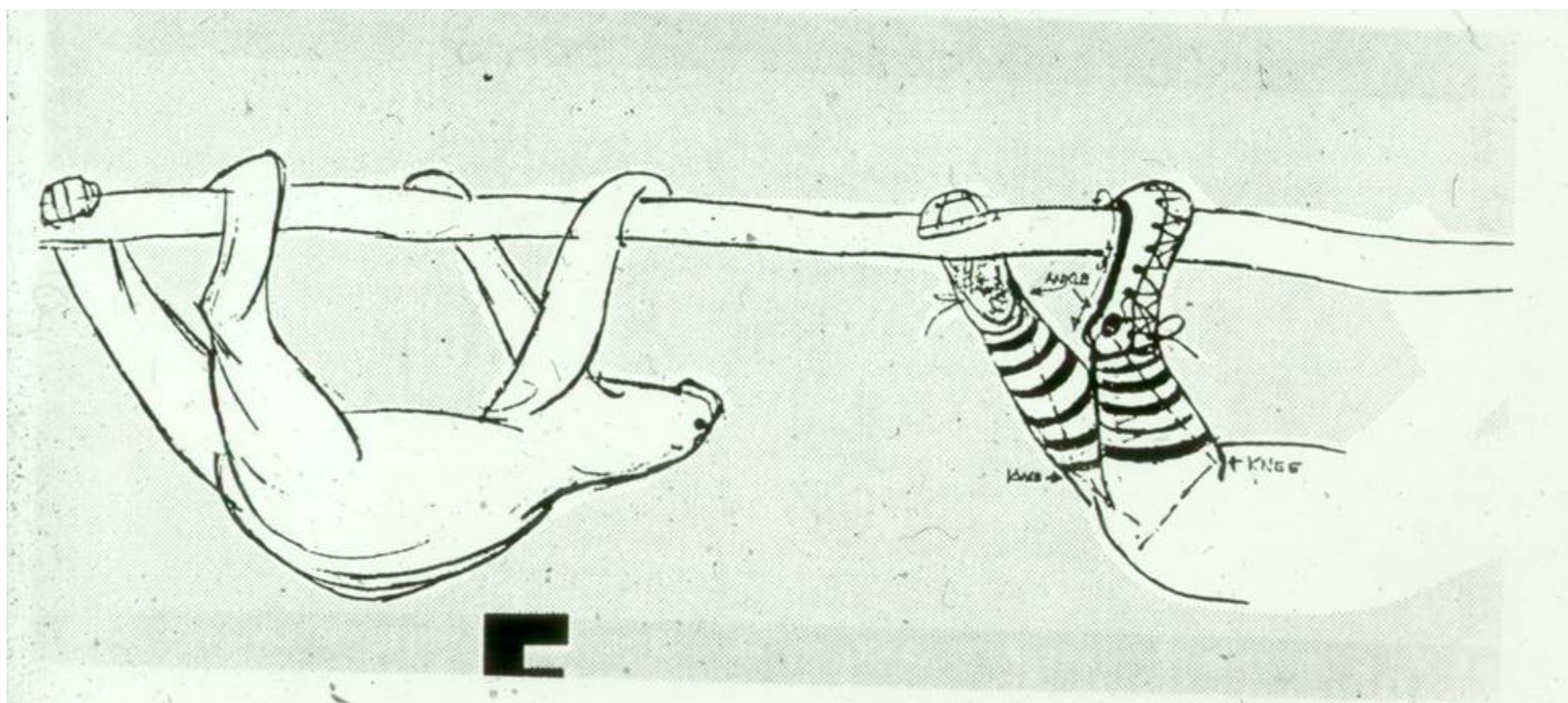
1. Physical Laws
2. Structure
3. Function
4. Ontogenetic Stage and Sex
5. Cutting and Pasting



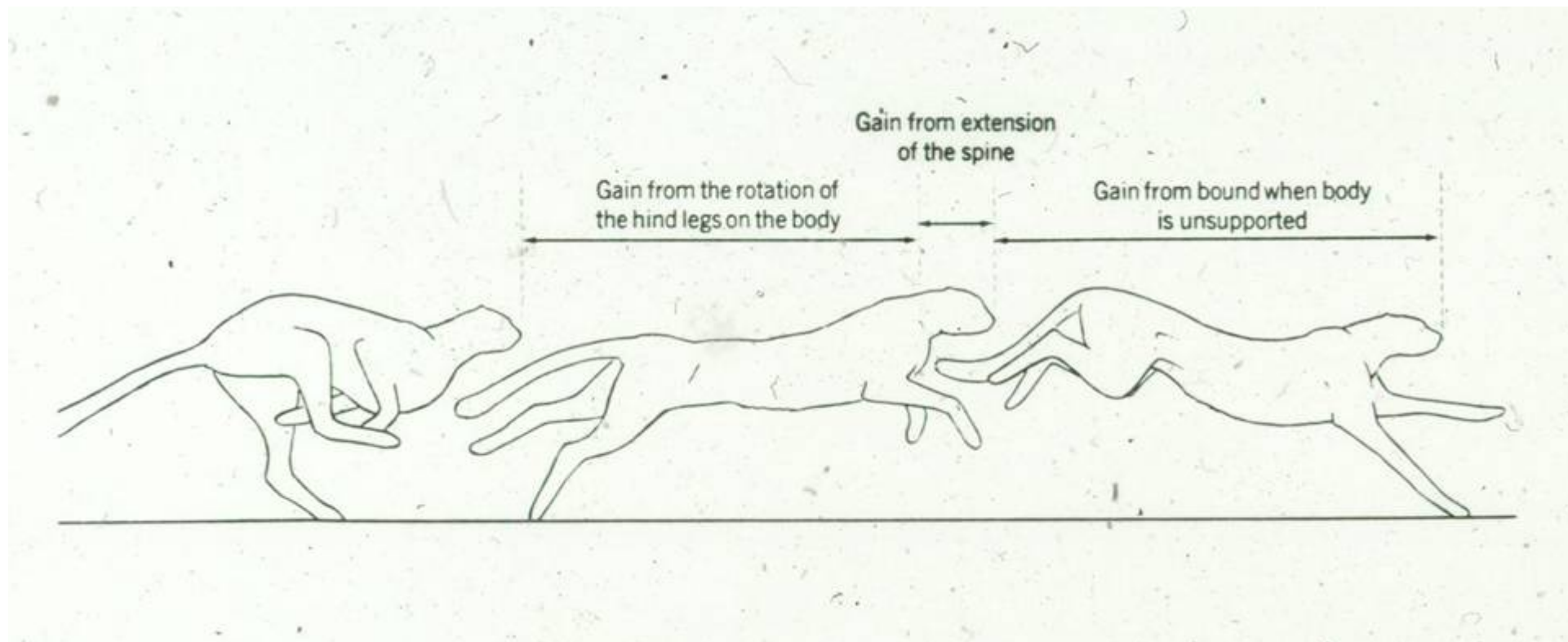




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TODAY'S SPECIAL

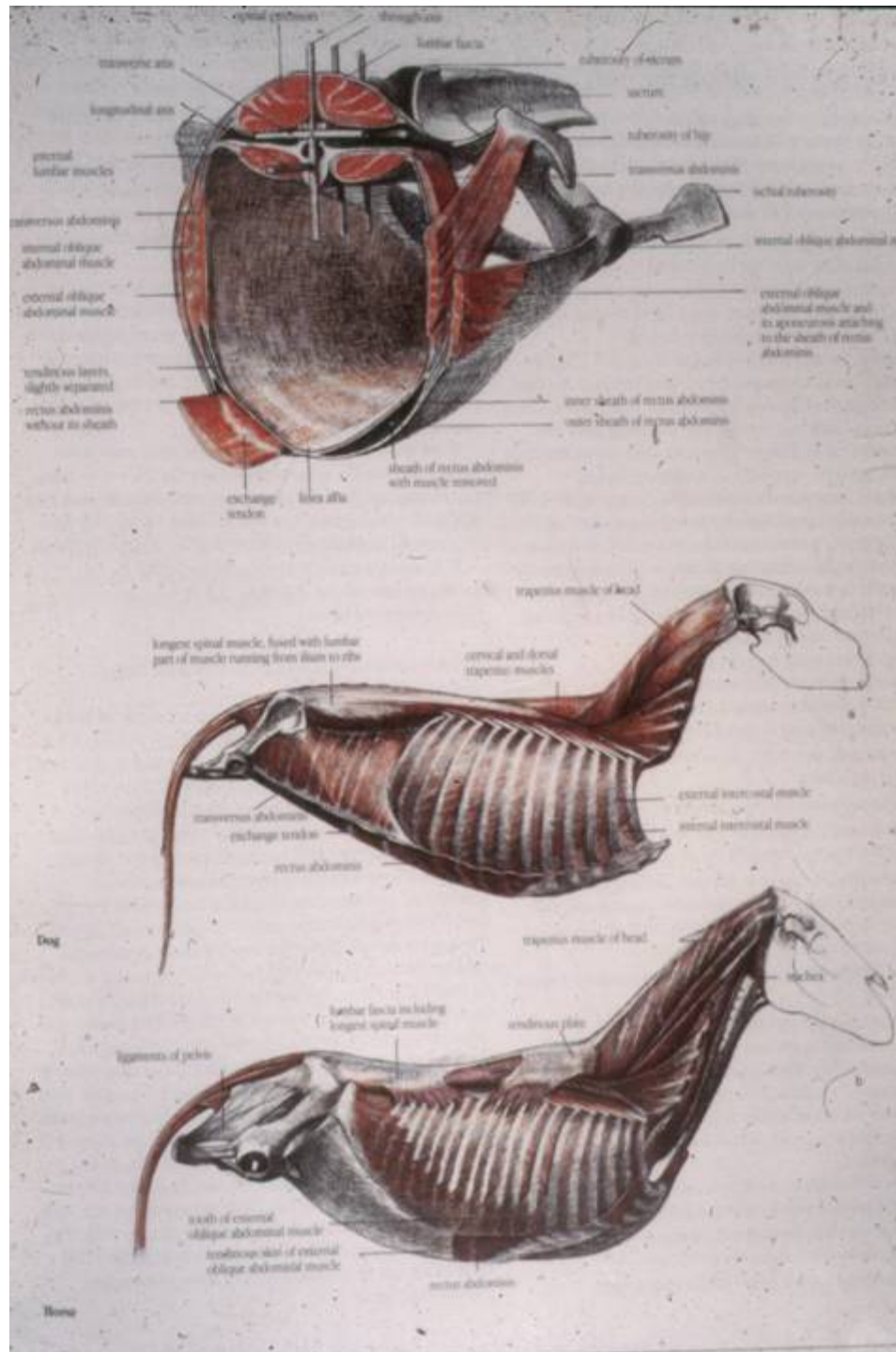
BRACHIALIS 69¢ lb.
LEVATOR SCAPULAE . . \$1.29 lb
RHOMBOIDEUS MAJOR . . 79¢ lb
EXTERNAL OBLIQUES . . 1.49 lb
SUPRASPINATUS . . . 79¢ lb.
LONGISSIMUS CAPITUS . . 1.12 lb
CATGUT 29¢ per ft.
HAIRBALLS 69¢ per doz

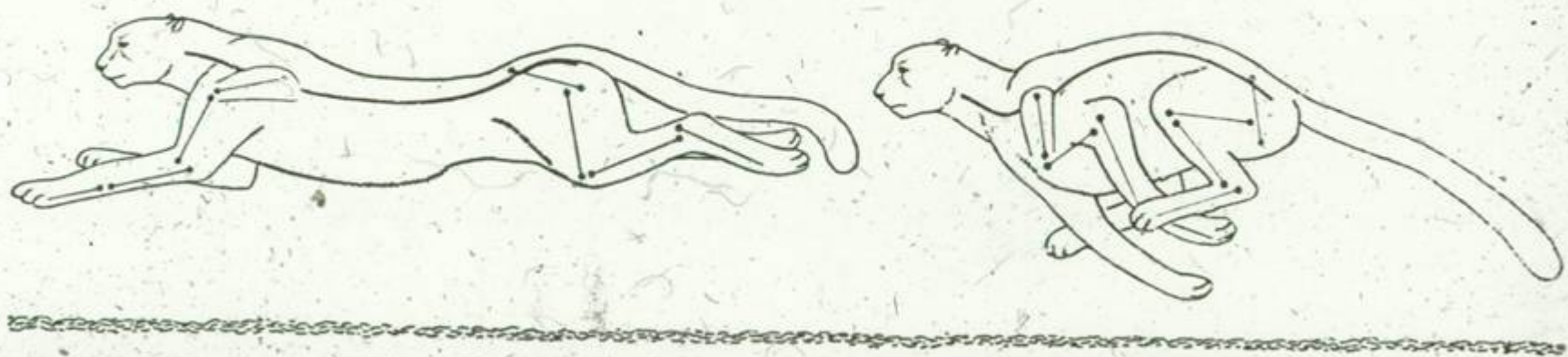
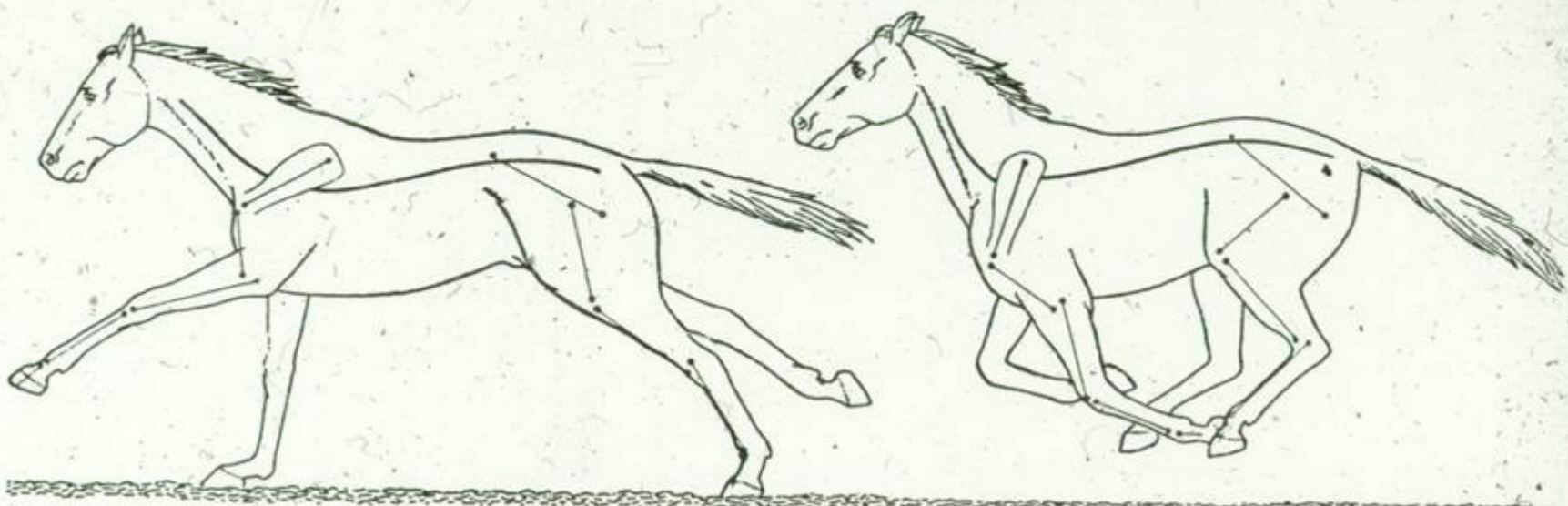


M. SWOFFORD
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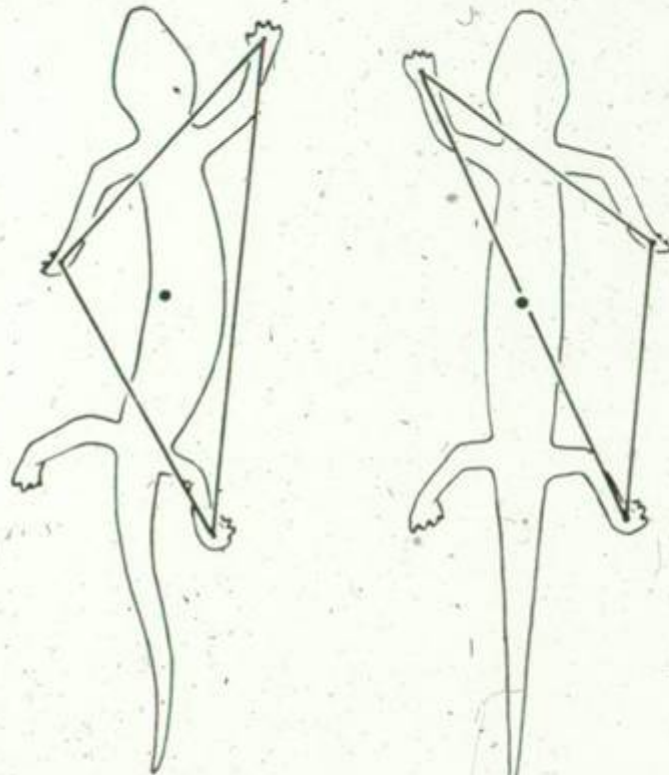
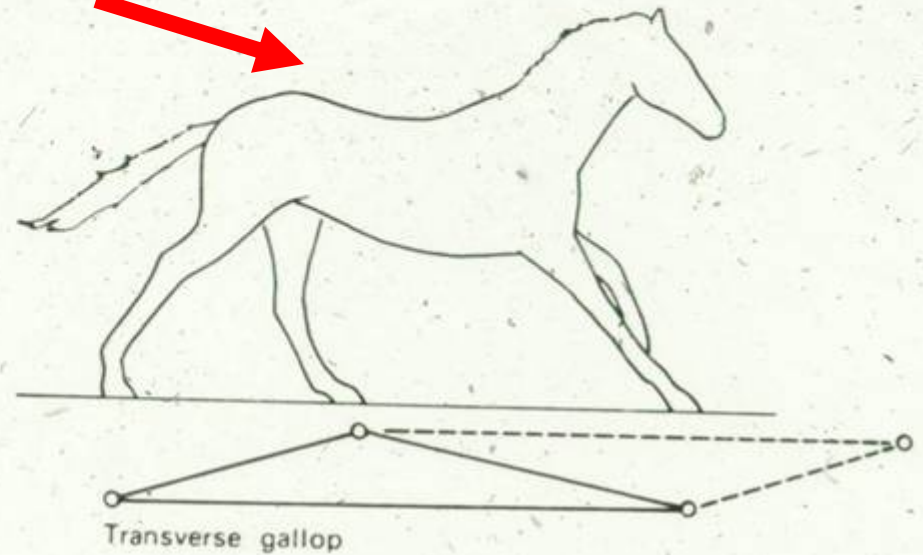








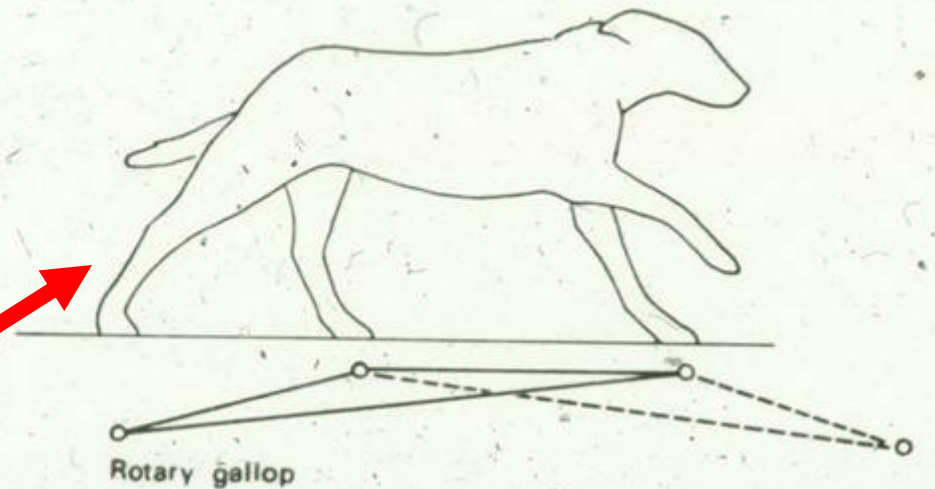
TRANSVERSE GALLOP



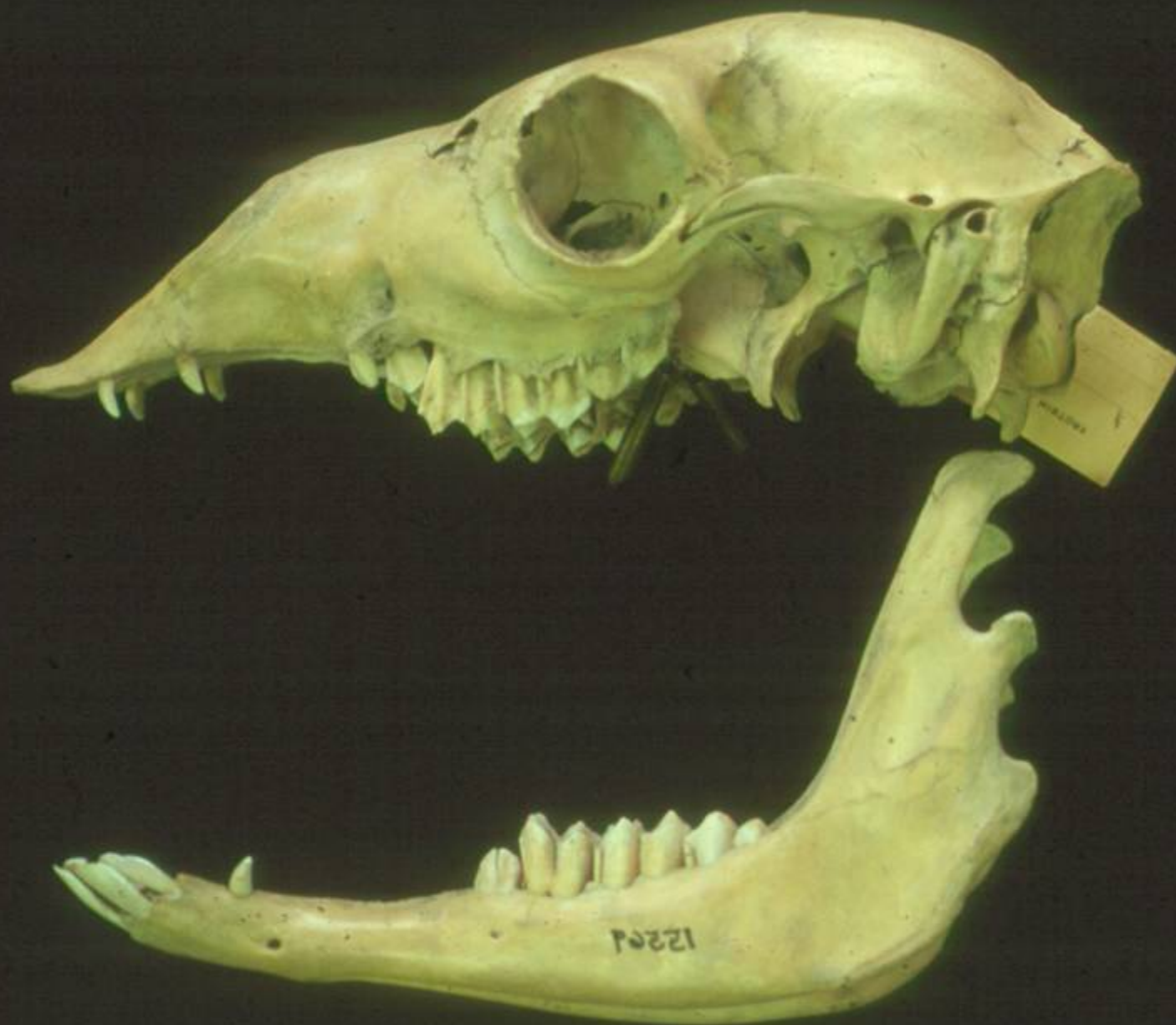
Lateral
sequence

Diagonal
sequence

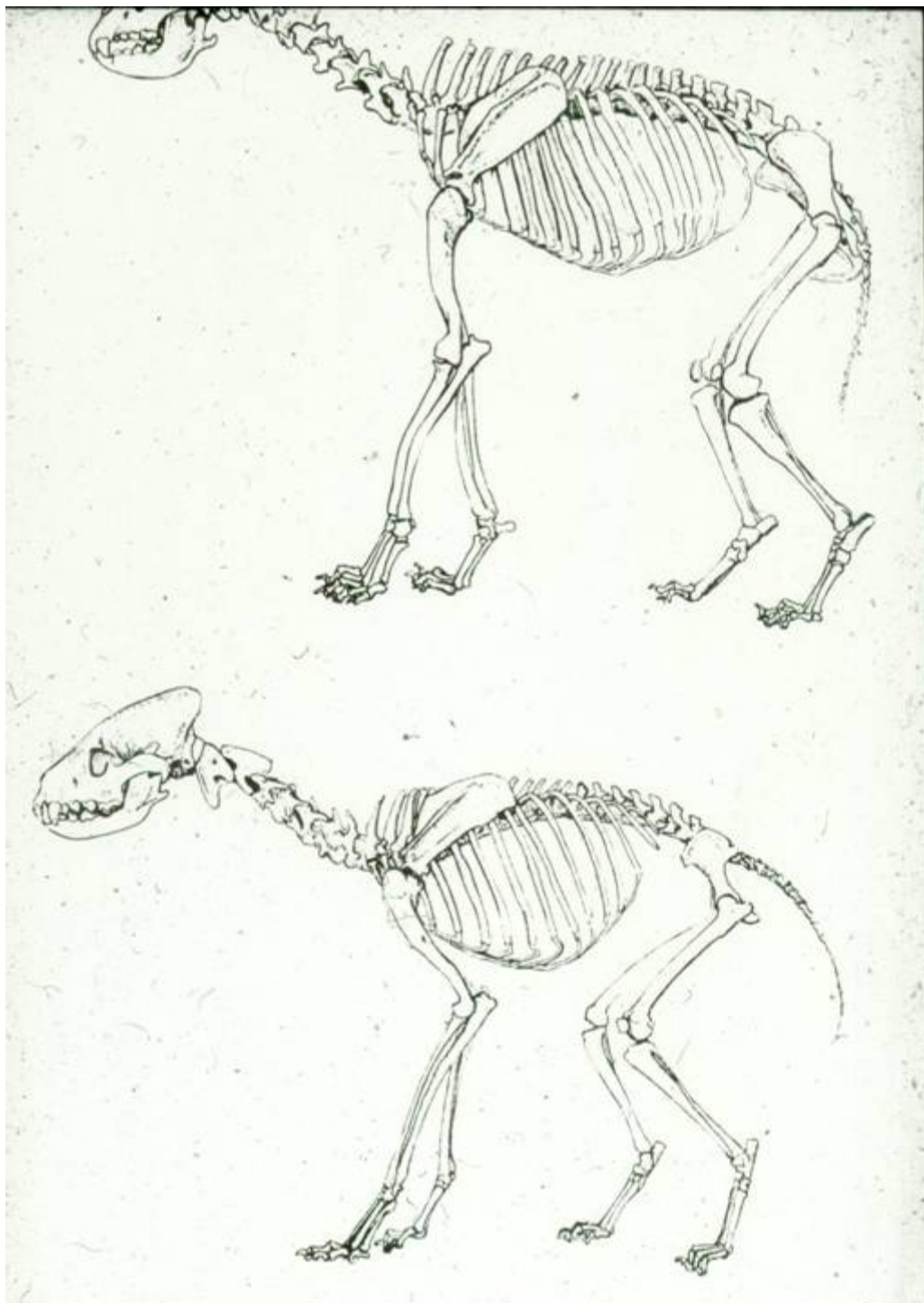
ROTARY GALLOP

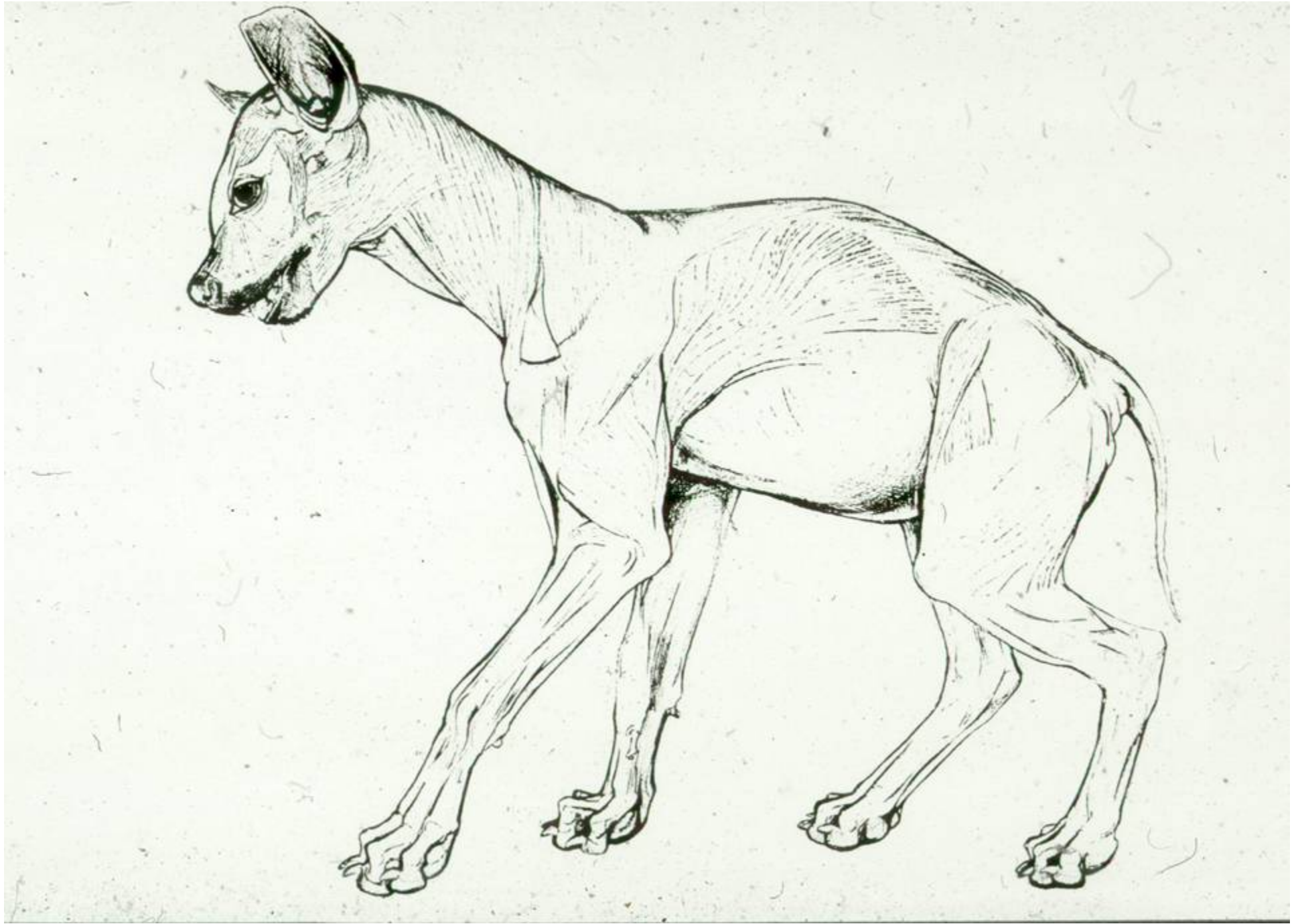












Primates

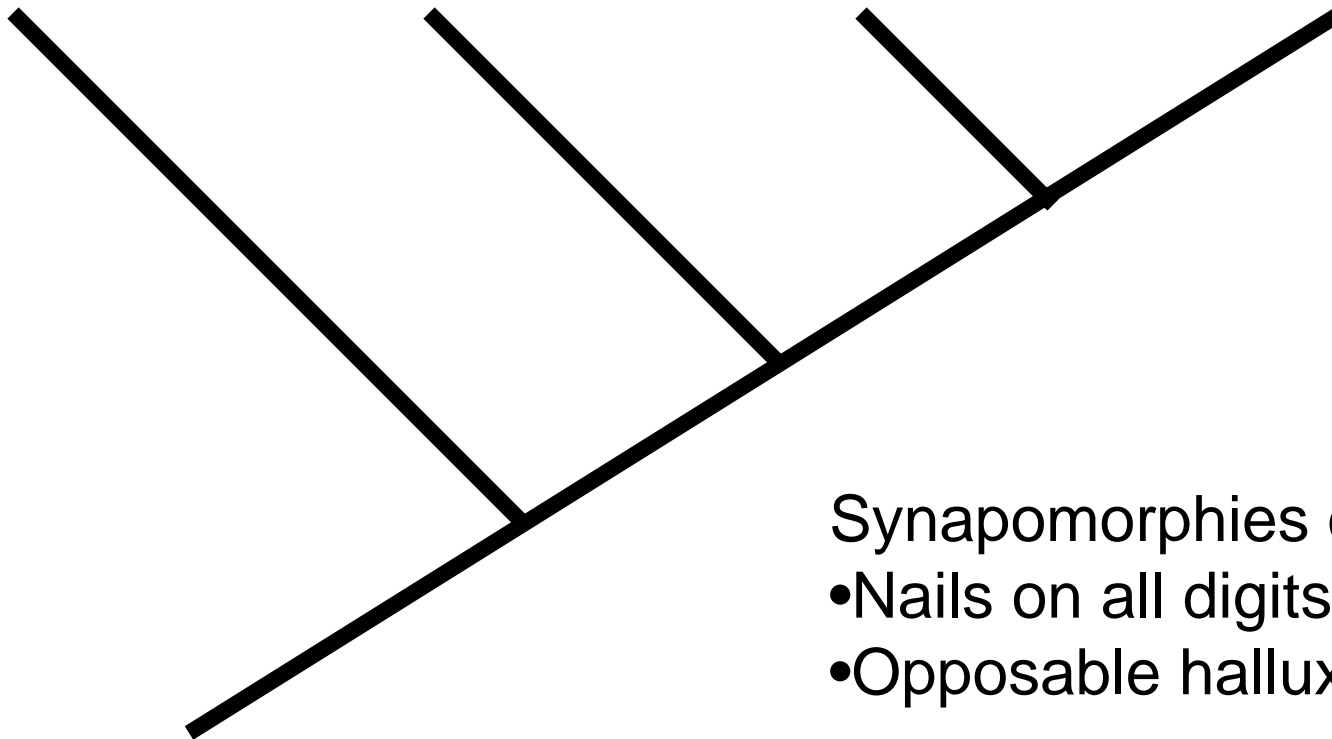
PRIMATES

“Prosimians”

New World
Monkeys

Old World
Monkeys

“Great Apes”
Hominoidea



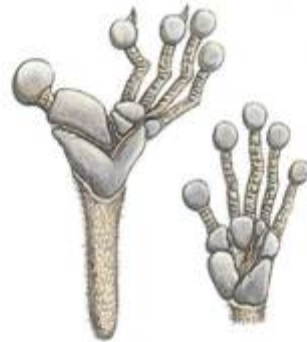
Synapomorphies of Primates:

- Nails on all digits
- Opposable hallux (big toe)*

*later lost in some

feet

hands



“Prosimians” include:

- Lemurs
- Lorises
- Aye-aye
- Tarsiers

Primitive, relatively small, arboreal forms.

Most have long tails, but none have prehensile tails.





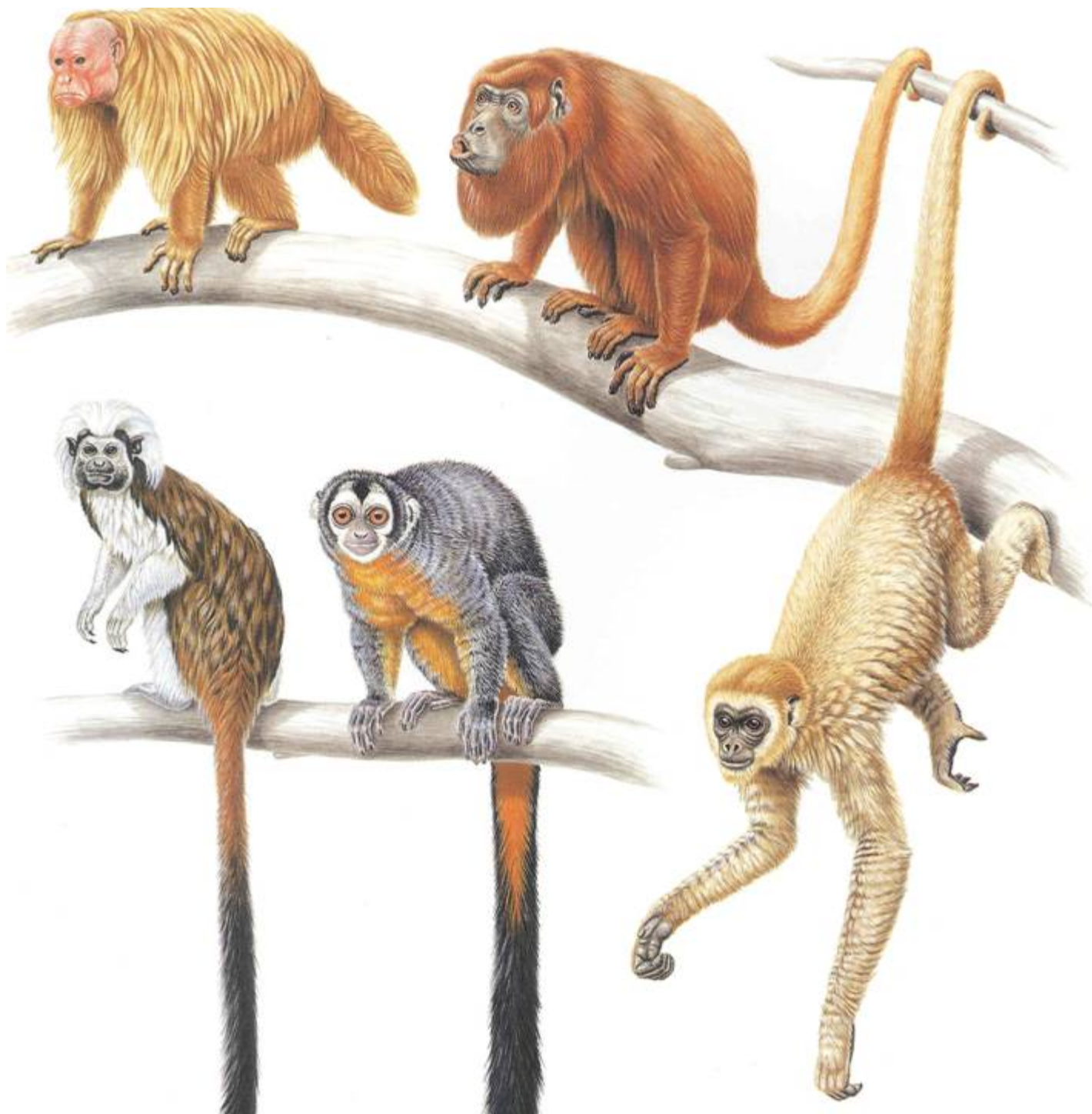






NEW WORLD MONKEYS

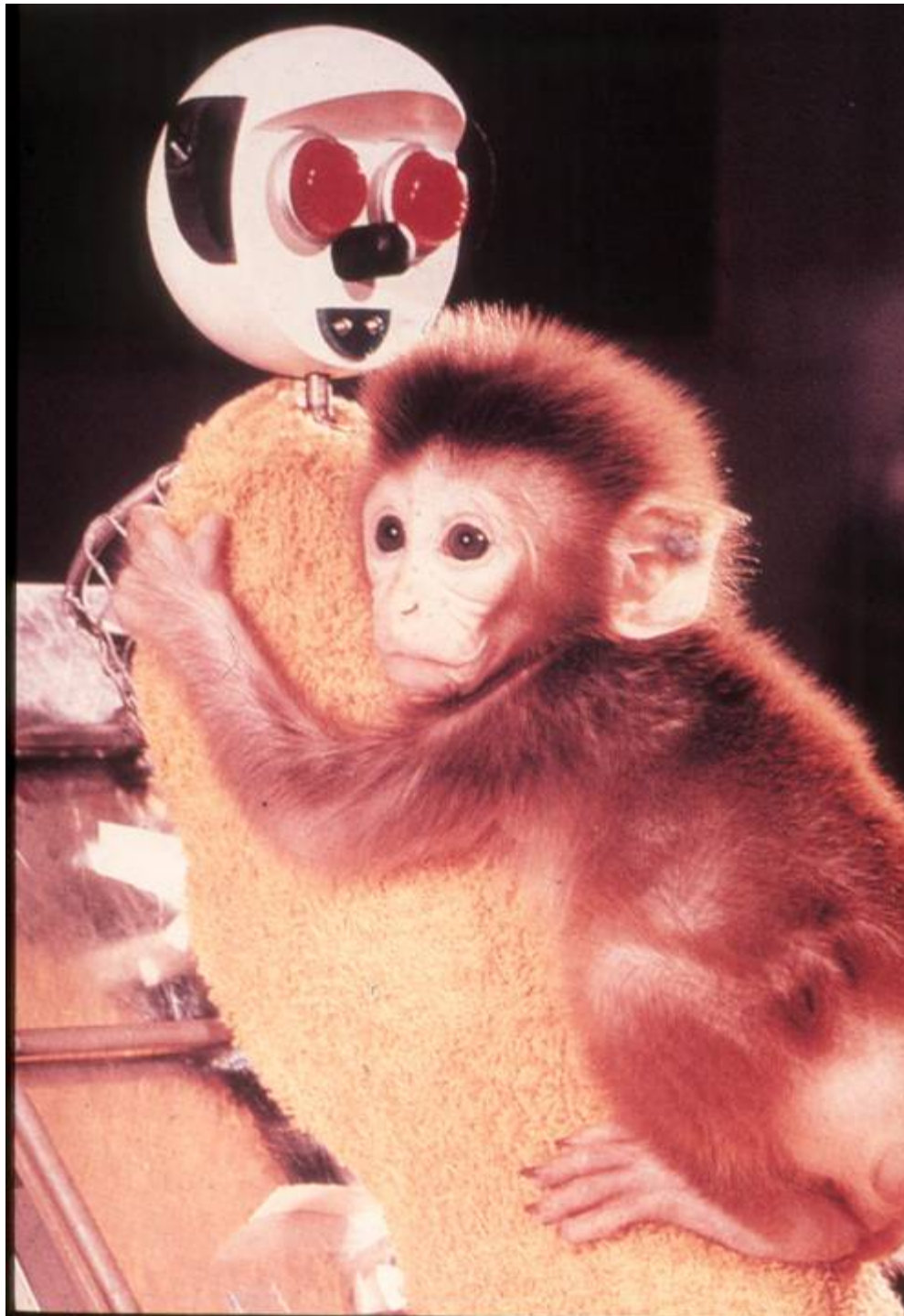
- Noses are “flat” – nostrils face sideways.
- Tail is often prehensile (acts like a fifth grasping structure)
- Arboreal
 - Quadrupedal locomotion on top of limbs
 - Brachiation (limb swinging)











OLD WORLD MONKEYS

- Noses are not “flat” – nostrils face forward
- Tail is not prehensile
- Arboreal forms
 - Quadrupedal locomotion on top of limbs
 - Brachiation (limb swinging)
- Terrestrial forms as well











Old World
Monkeys:

Tails are not
prehensile



HOMINOIDEA (The Great Apes)

Living Members:

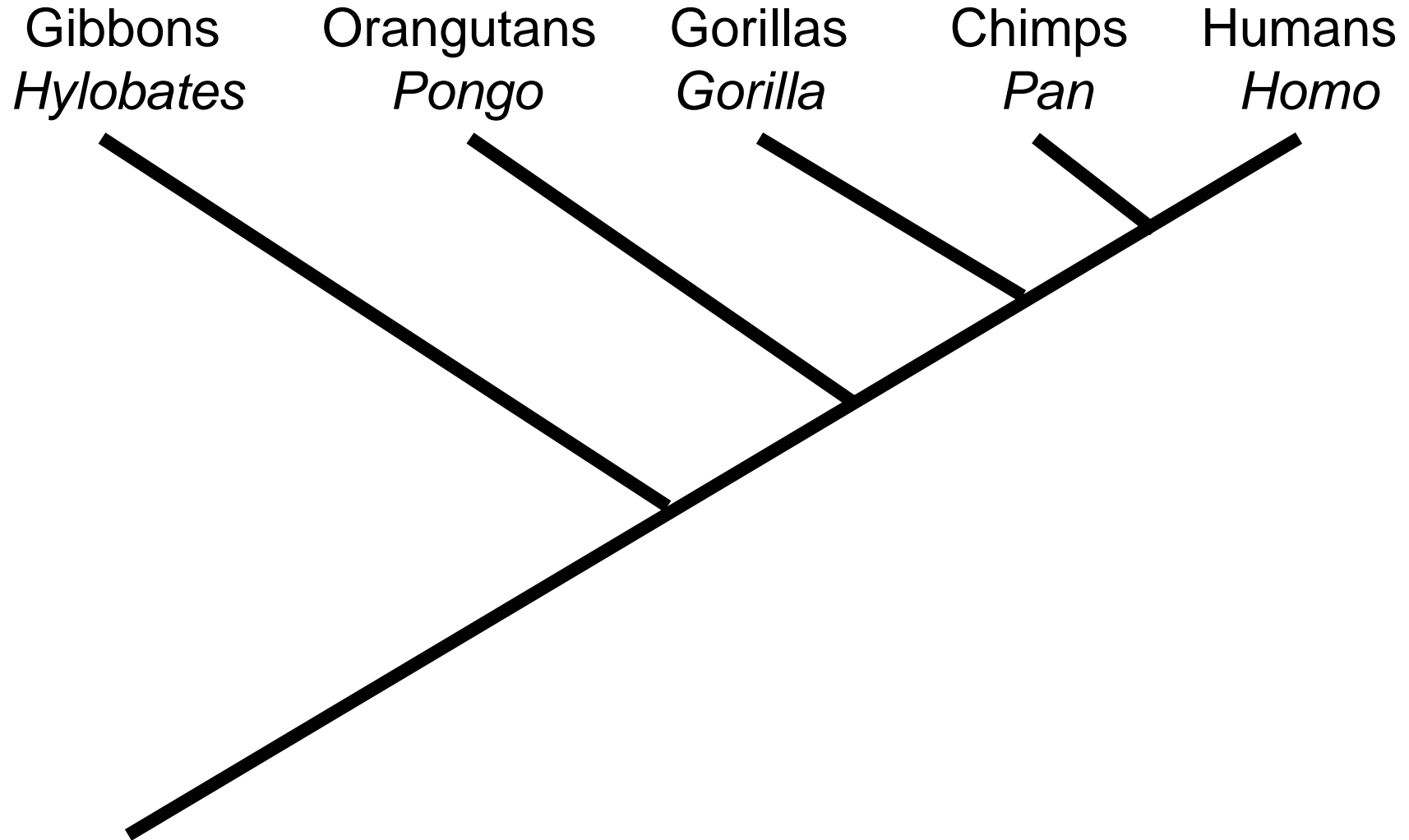
- Gibbons
- Orangutans
- Gorillas
- Chimpanzees and Bonobos
- Humans

Tail significantly reduced.

Group was originally arboreal.

Many members now terrestrial.

HOMINOIDEA (Living Members)









Dichromatic species of gibbon



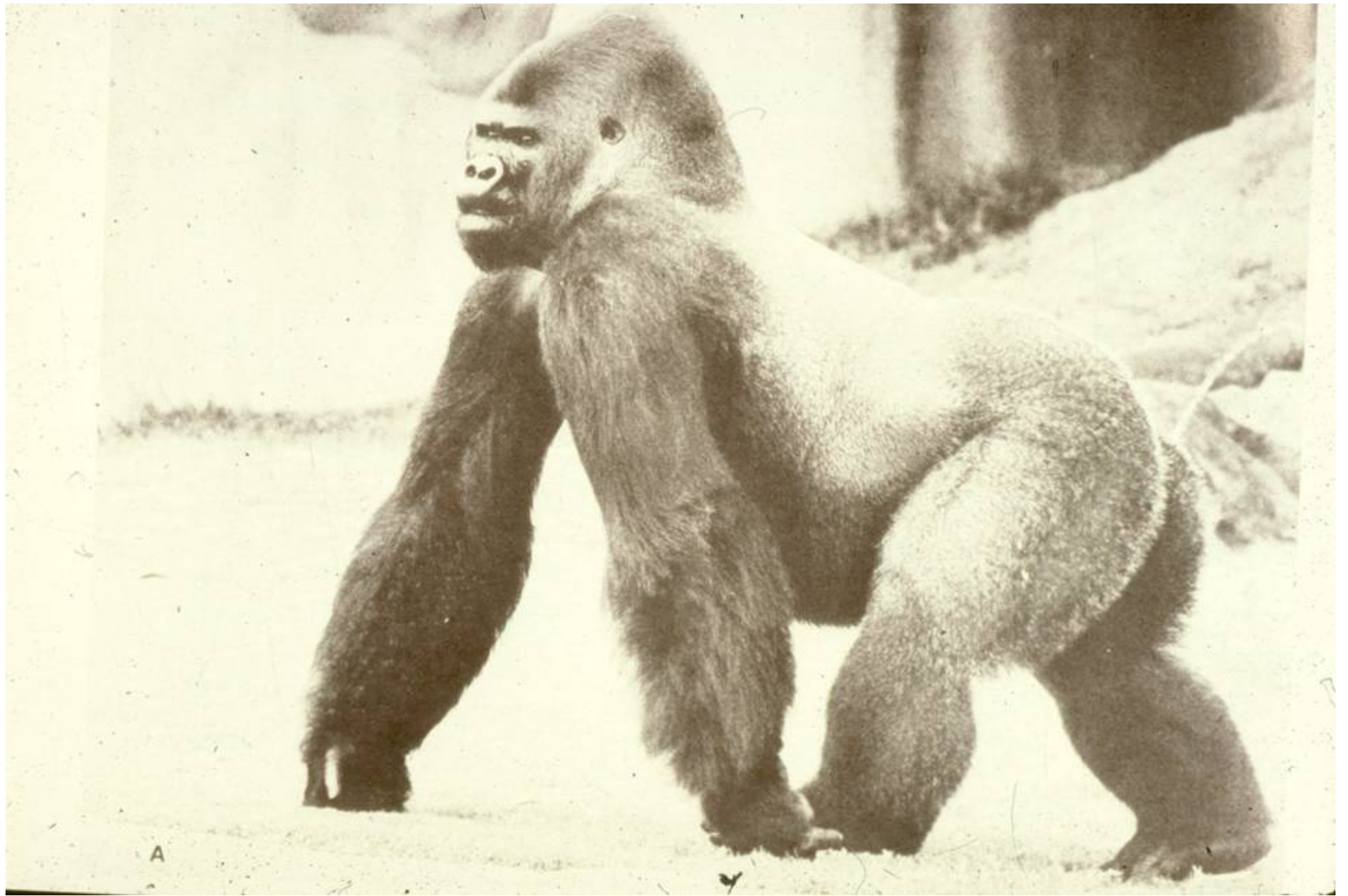


Orangutans use all four limbs equally in climbing. Hands and feet are essentially equivalent.

**QUADRUMANUAL
Condition**

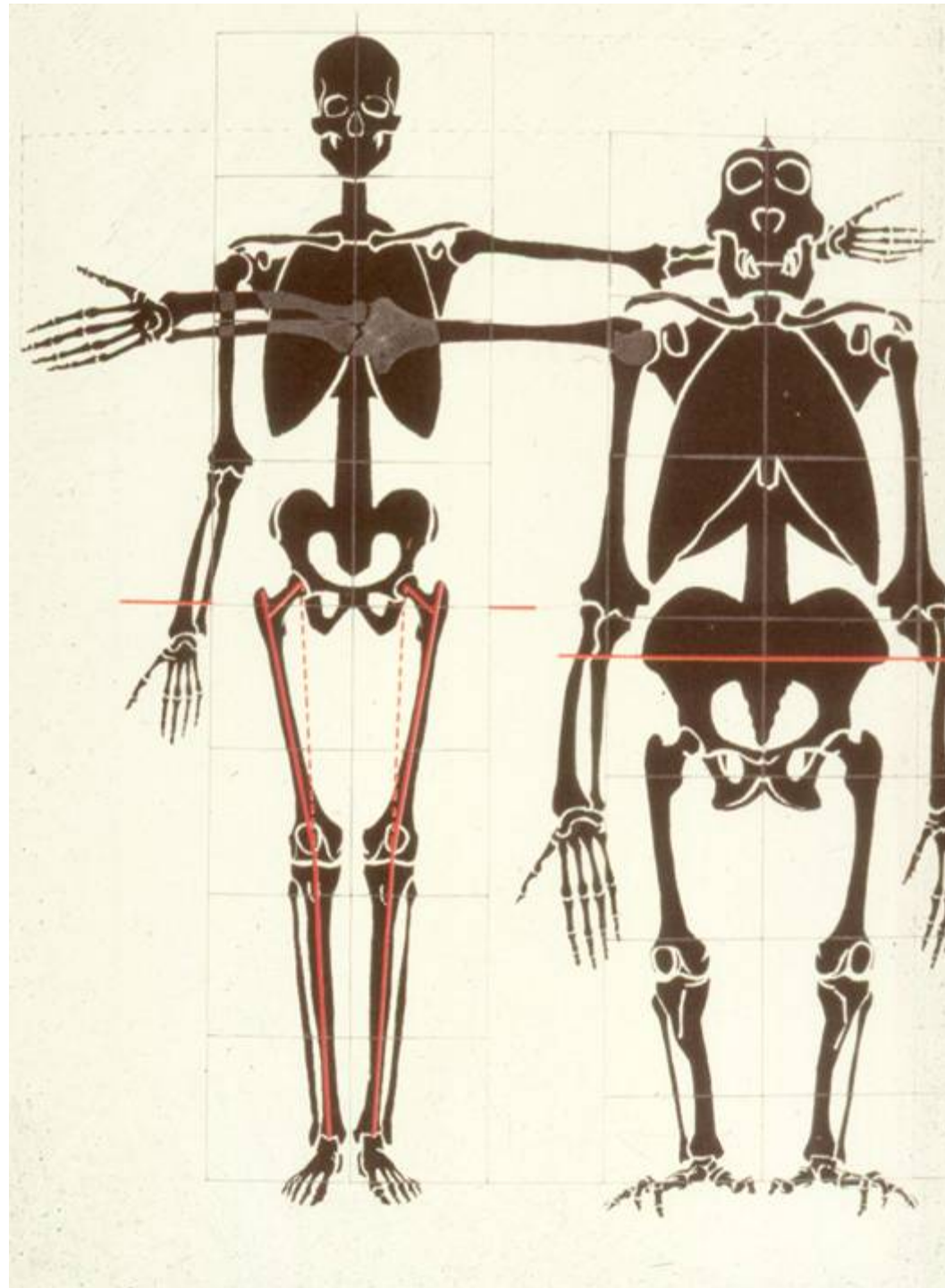


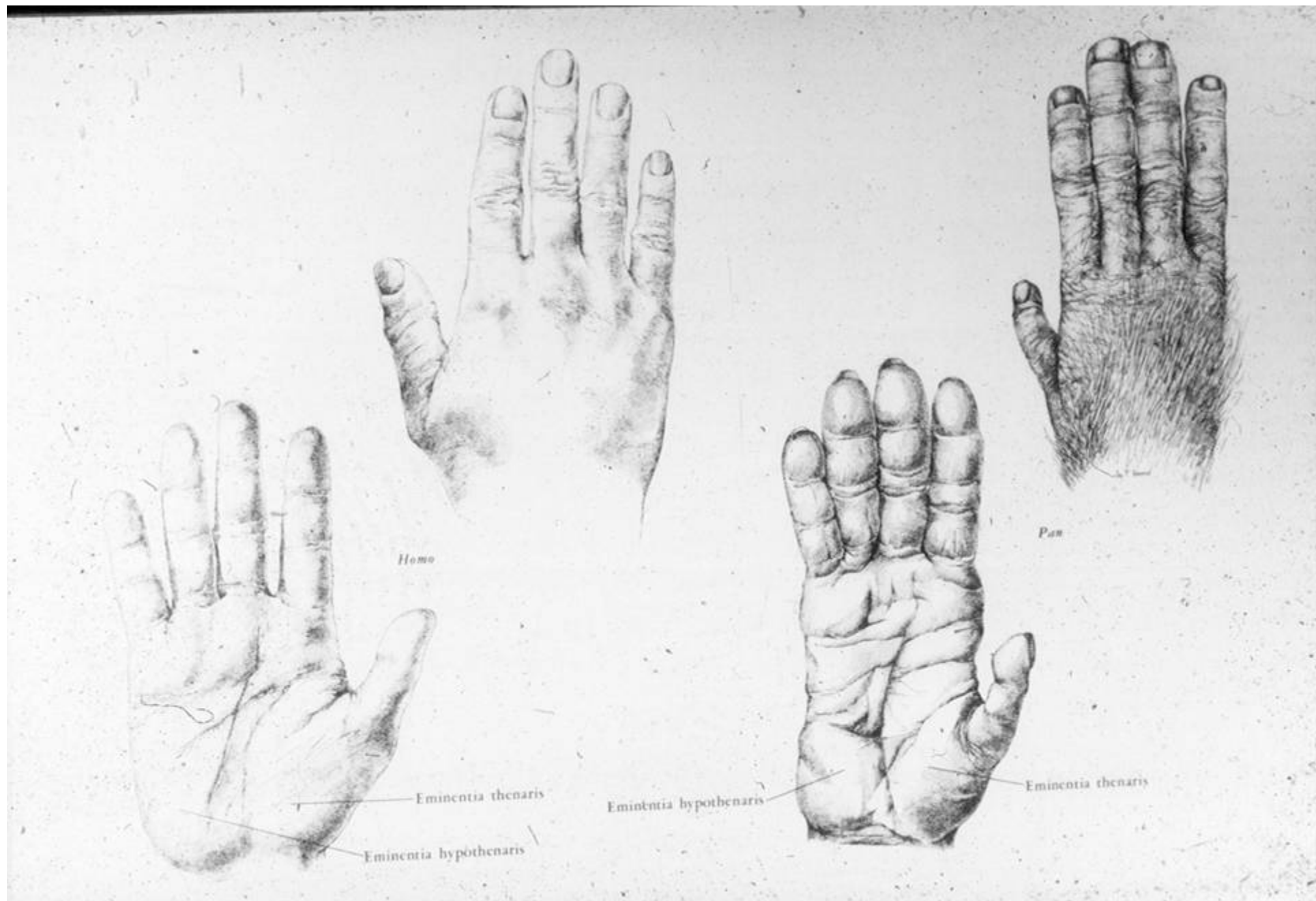


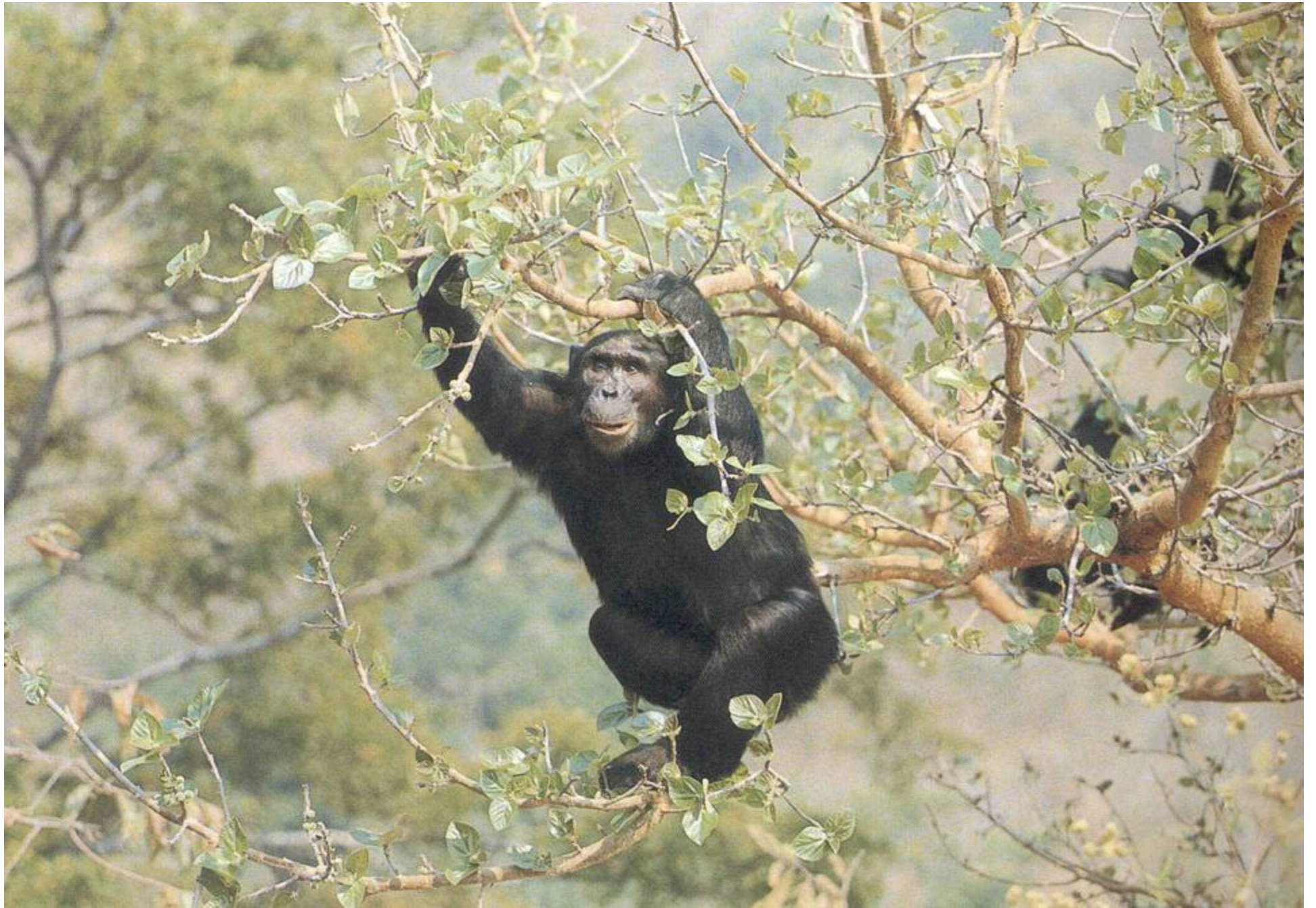






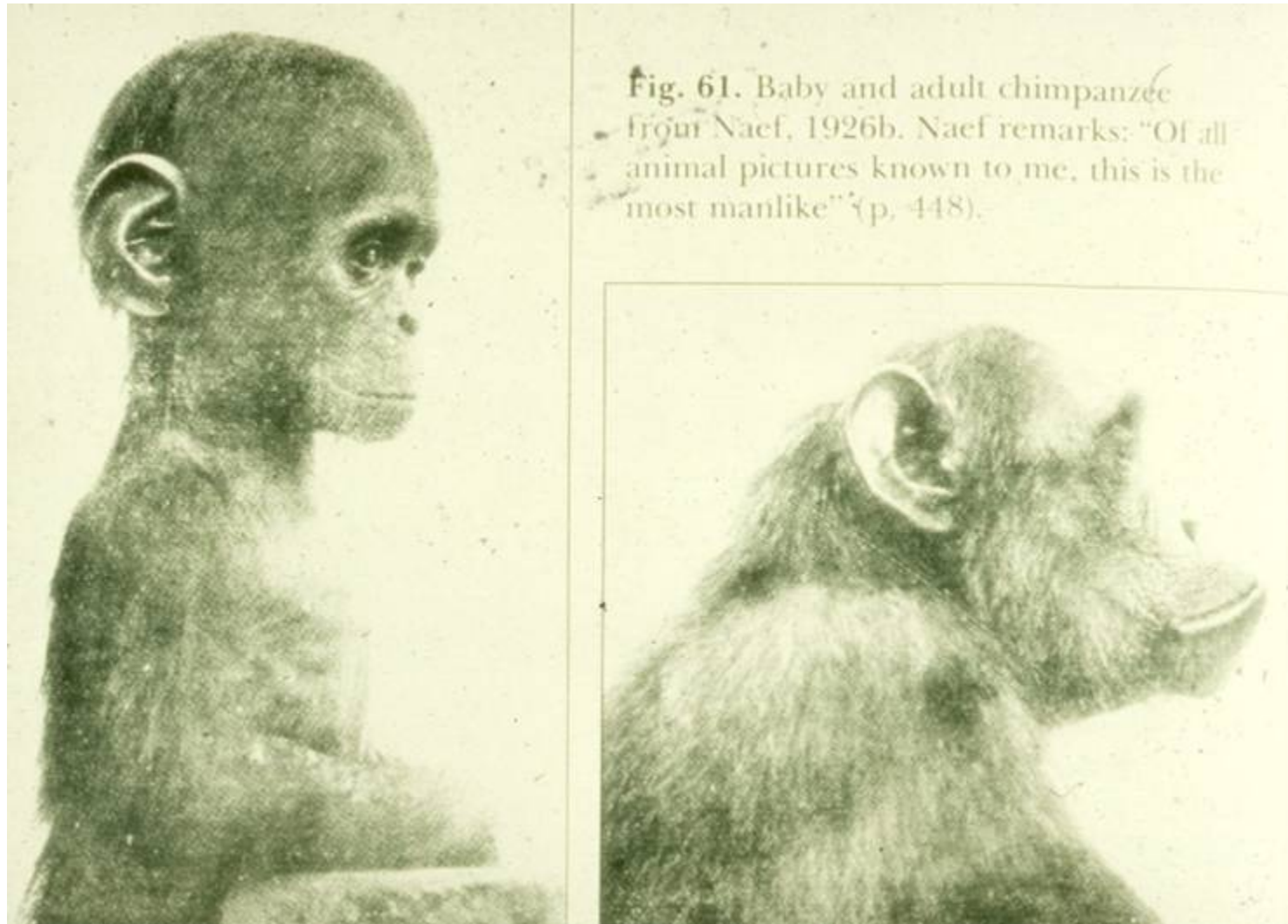










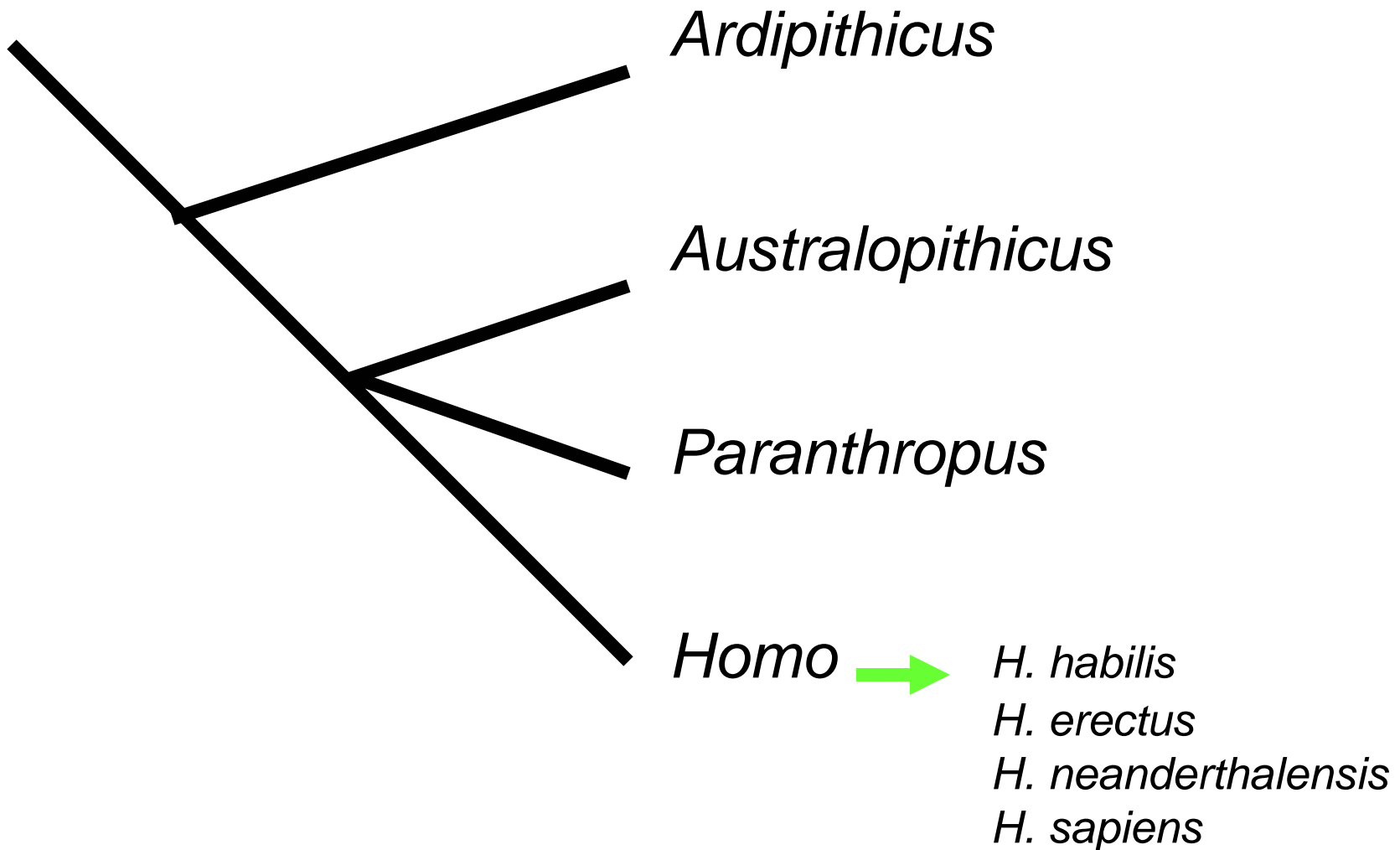


Humans are more similar to juvenile apes than adult apes. Neotony!

THE FAMILY HOMINIDAE

Major Genera

Species



Australopithecus afarensis is amongst the most important of early hominid fossils.

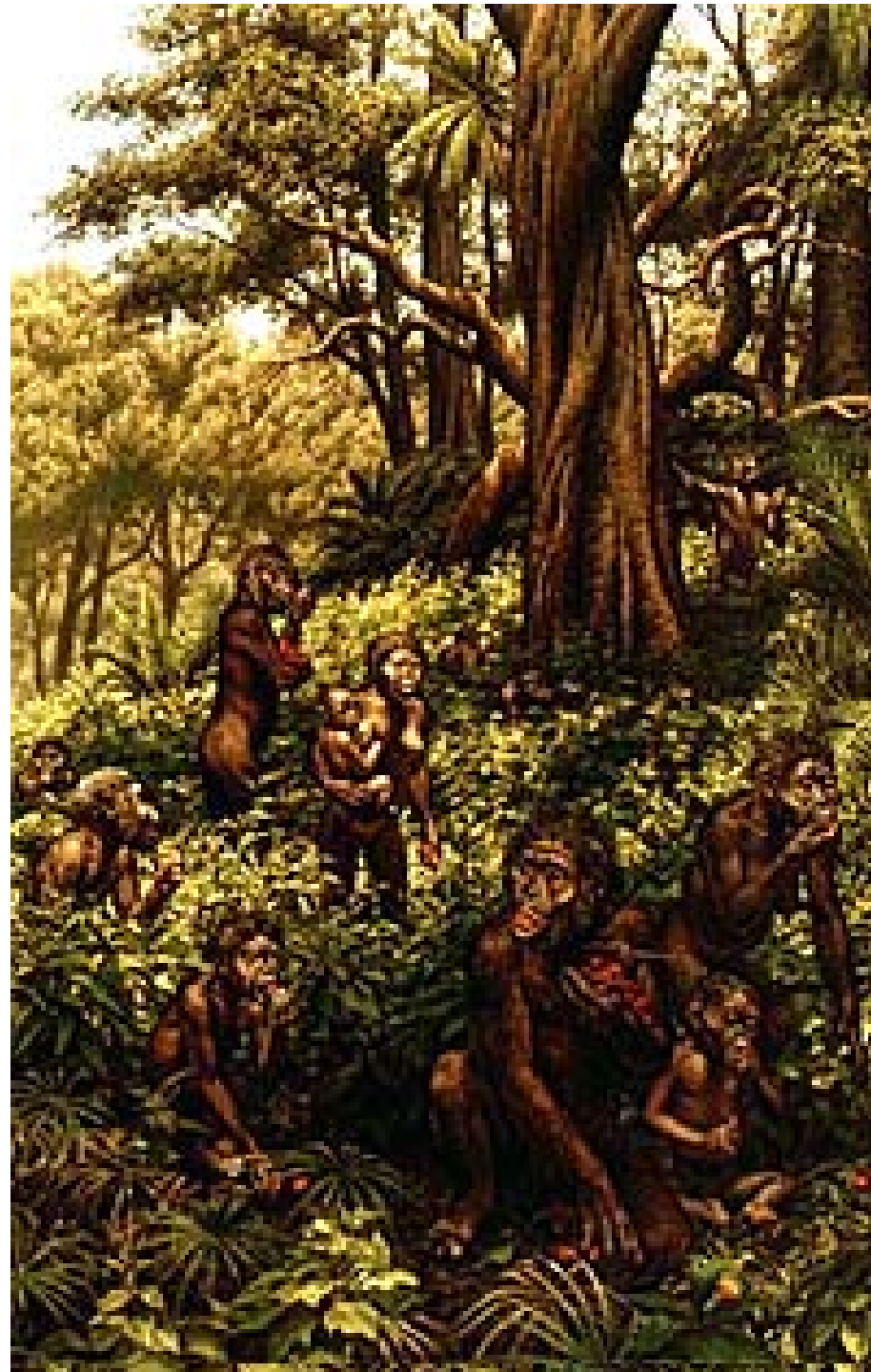
It is amongst the most complete of early fossils to demonstrate the orthograde, bipedal nature of early hominids...3.8 to 4 million years old.

“Lucy” is an example of *Australopithicus afarensis*



Orthograde
bipedality

Key feature:
position of femur
in hip socket



Homo habilis – the first human tool users?

Homo erectus – more gracile and more fully orthograde.

Homo neanderthalensis – larger brains than modern *Homo sapiens*. Lived side-by-side with *Homo sapiens*.



Homo habilis – the first human tool users?



Homo erectus – more gracile and more fully orthograde than more primitive groups.

Recent analysis of footprint fossils indicate a style of walking very much like *Homo sapiens*.



Homo erectus – more gracile and more fully orthograde.



Homo neanderthalensis



Homo neanderthalensis tool



Homo neanderthalensis reconstruction



COMPARISON OF *HOMO NEANDERTHALENSIS* (LEFT) AND *HOMO SAPIENS* (RIGHT) SKELETONS

Recent analysis of the *H. neanderthalensis* genome suggests they did NOT interbreed.



Homo floresiensis



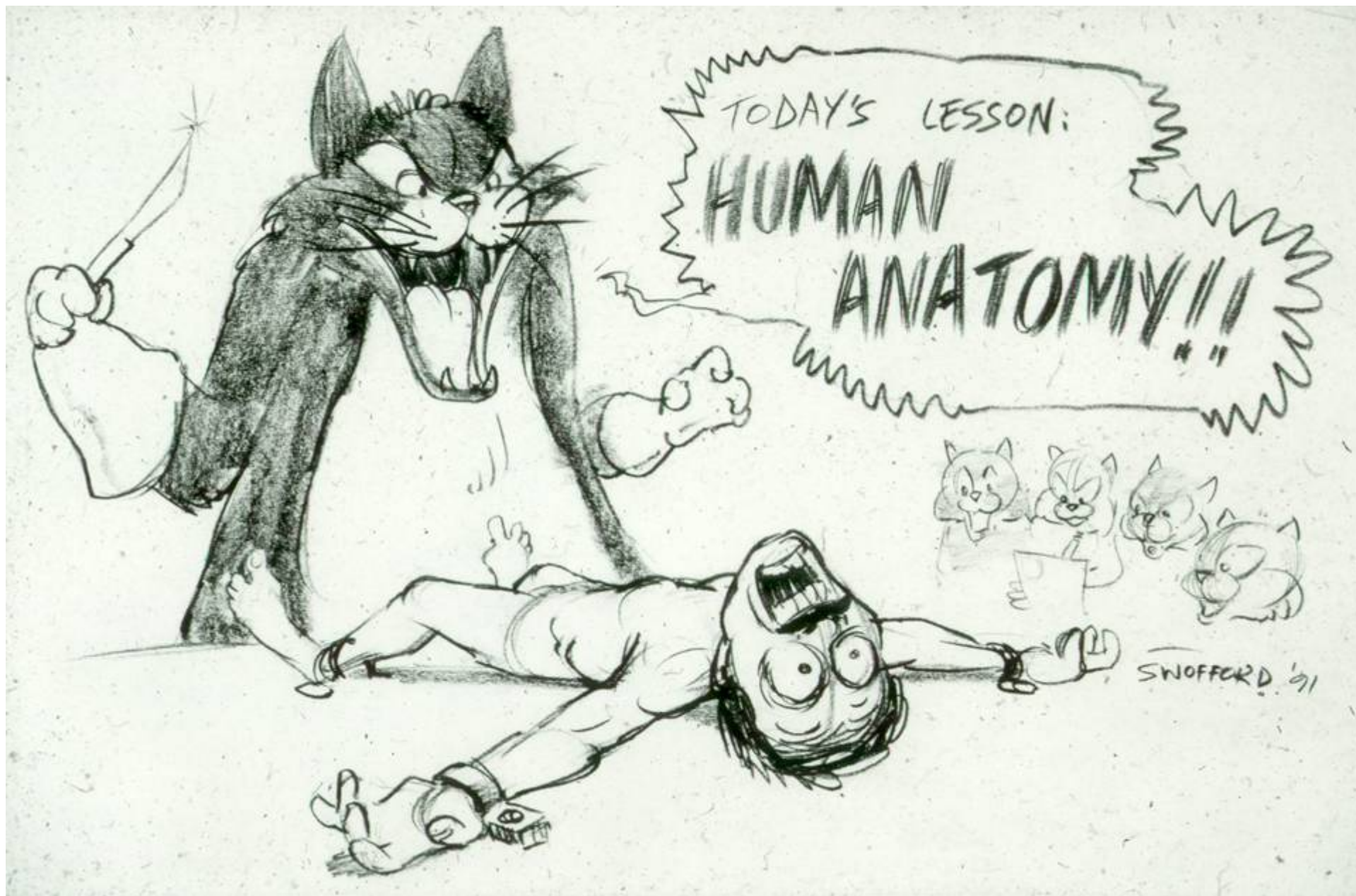
Homo floresiensis

Possibly one of the most amazing of recent discoveries.

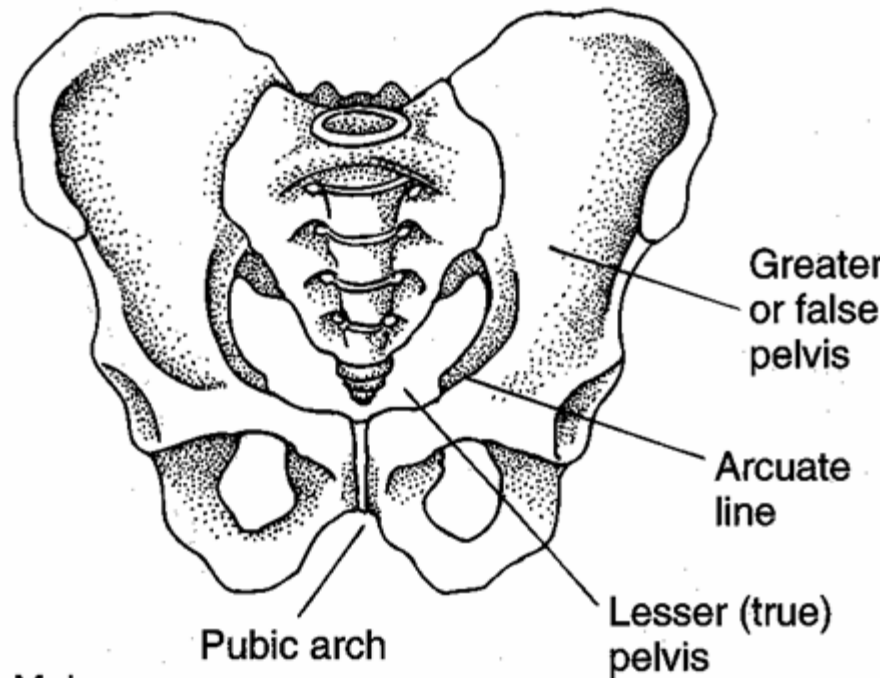
The discovery of a very small, (~ 1 meter tall) new species of *Homo* that lived on islands near Indonesia only about 38,000 to 18,000 years ago.

Some have tried to argue they were pathological, but this is not correct.



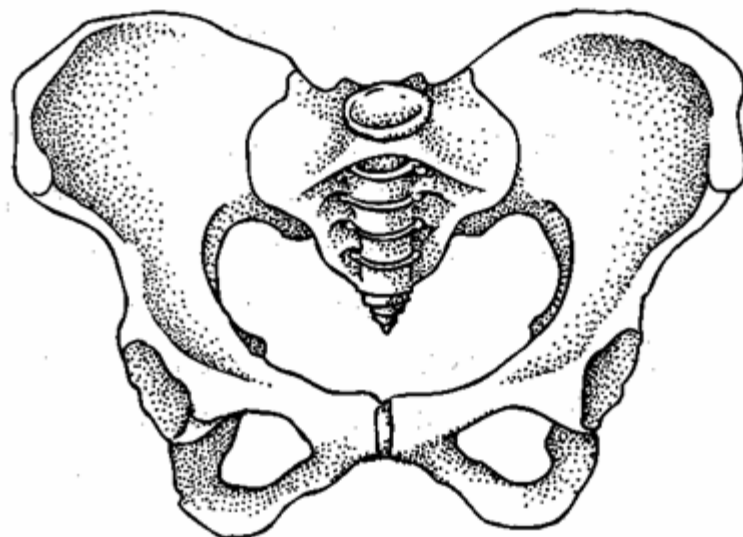


HUMAN SEXUAL DIMORPHISM

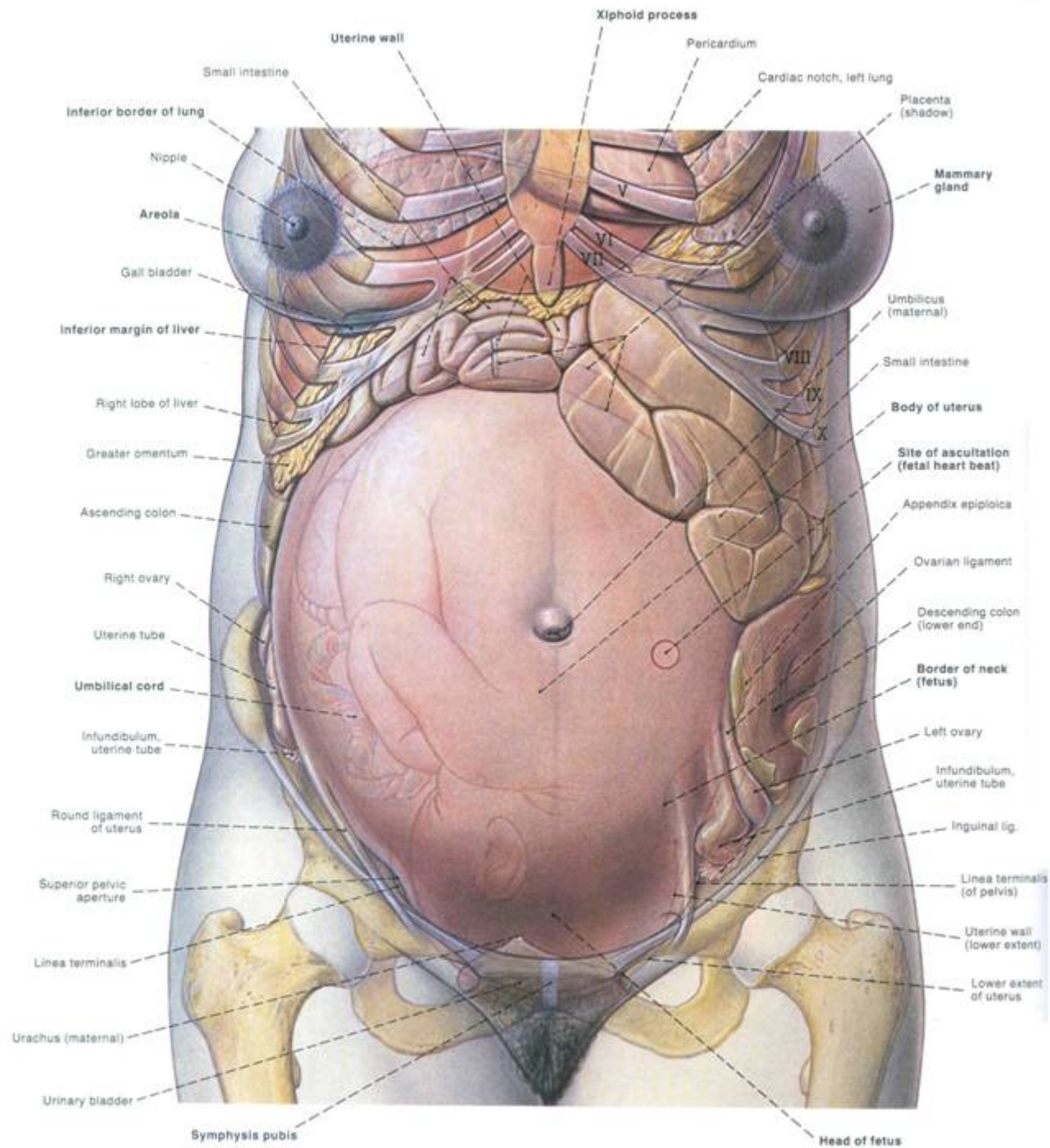


Male and female hips are of differing proportions:

Males: taller, narrower, pubic angle less than 90 degrees, circular opening.



Females: wider, pubic angle greater than 90 degrees, oval opening.





Females:
Shorter torsos,
longer legs.

Males: longer
torsos, shorter
legs.