THE RELATIONSHIP OF ONTOGENESIS AND PHYLOGENESIS. DIVERGENCE, CONVERGENCE AND CONCURRENCY.

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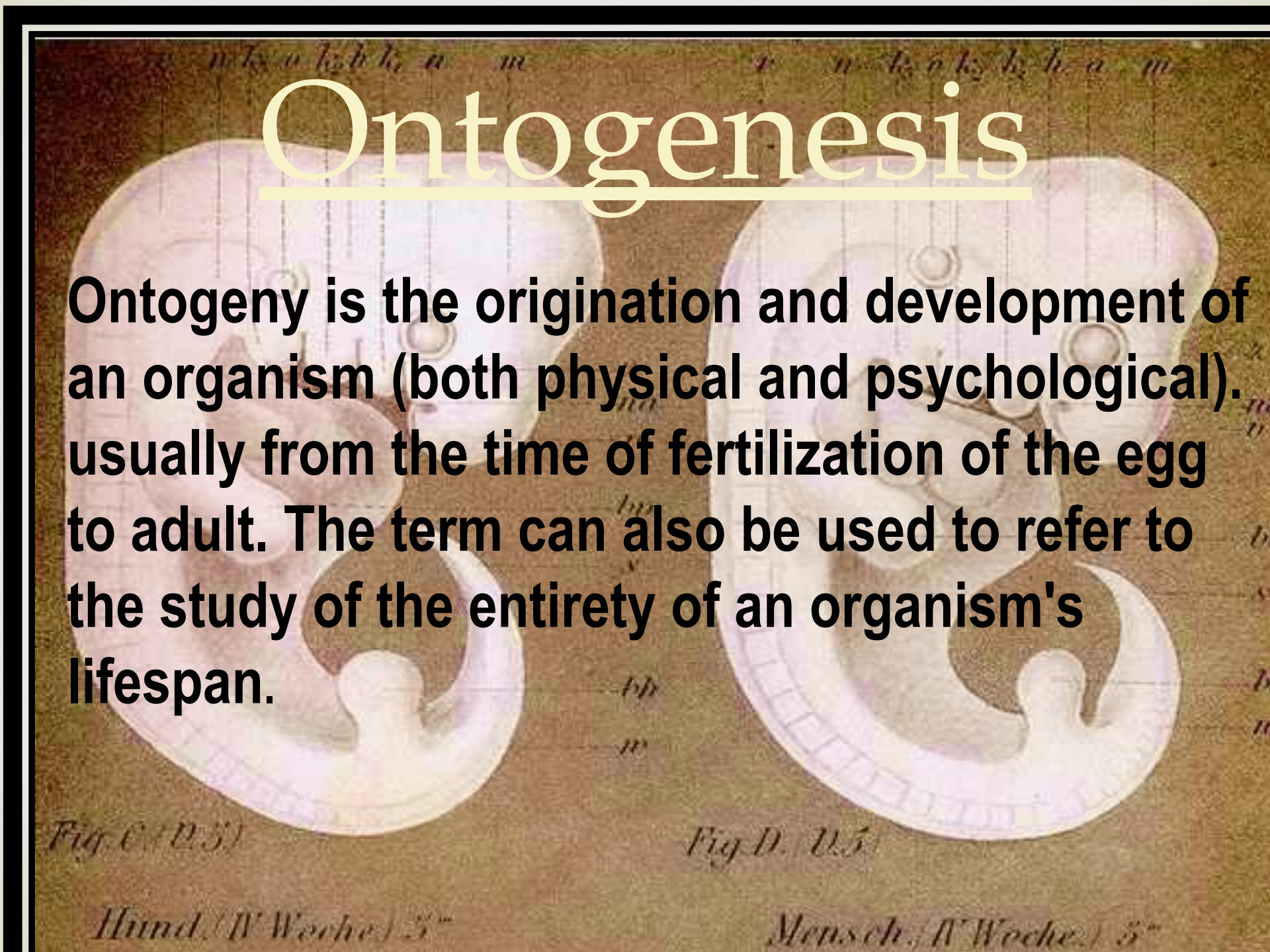
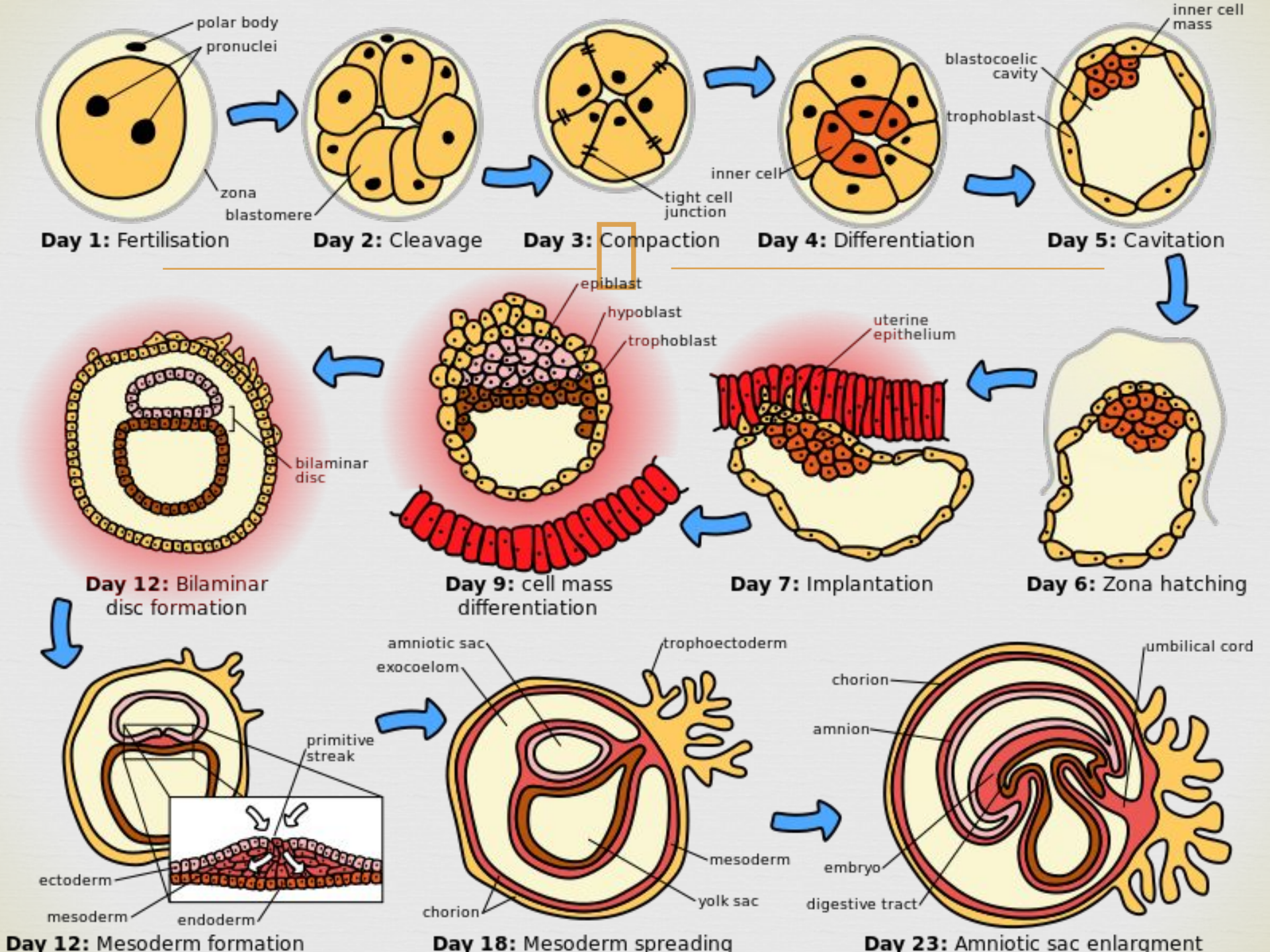
Ontogenesis

Ontogeny is the origination and development of an organism (both physical and psychological). usually from the time of fertilization of the egg to adult. The term can also be used to refer to the study of the entirety of an organism's lifespan.



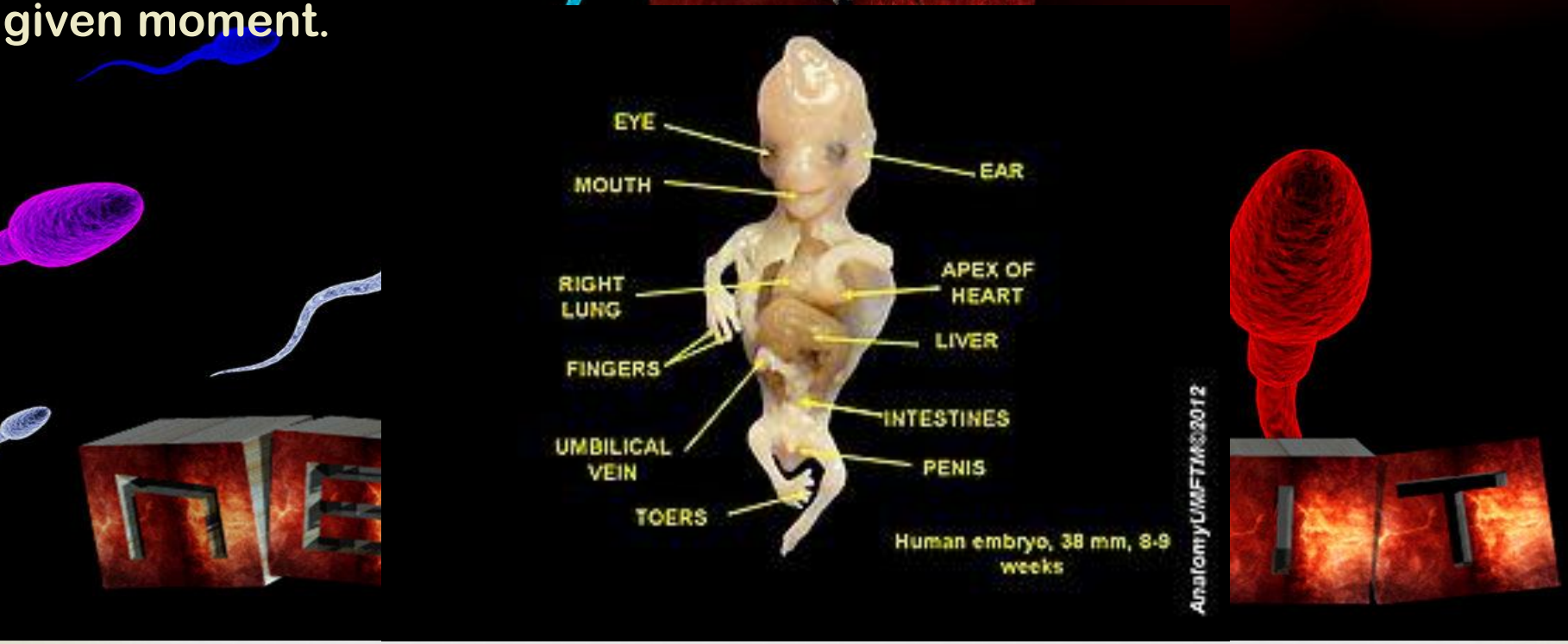

polar body
pronuclei
zona
blastomere
tight cell junction
inner cell
blastocoelic cavity
trophoblast
inner cell mass
Day 1: Fertilisation
Day 2: Cleavage
Day 3: Compaction
Day 4: Differentiation
Day 5: Cavitation
Day 6: Zona hatching
uterine epithelium
Day 7: Implantation
epiblast
hypoblast
trophoblast
Day 9: cell mass differentiation
bilaminar disc
Day 12: Bilaminar disc formation
primitive streak
ectoderm
mesoderm
endoderm
Day 12: Mesoderm formation
amniotic sac
exocoelom
trophoectoderm
mesoderm
yolk sac
chorion
Day 18: Mesoderm spreading
chorion
amnion
umbilical cord
embryo
digestive tract
Day 23: Amniotic sac enlargment

Details of Ontogenetic Development

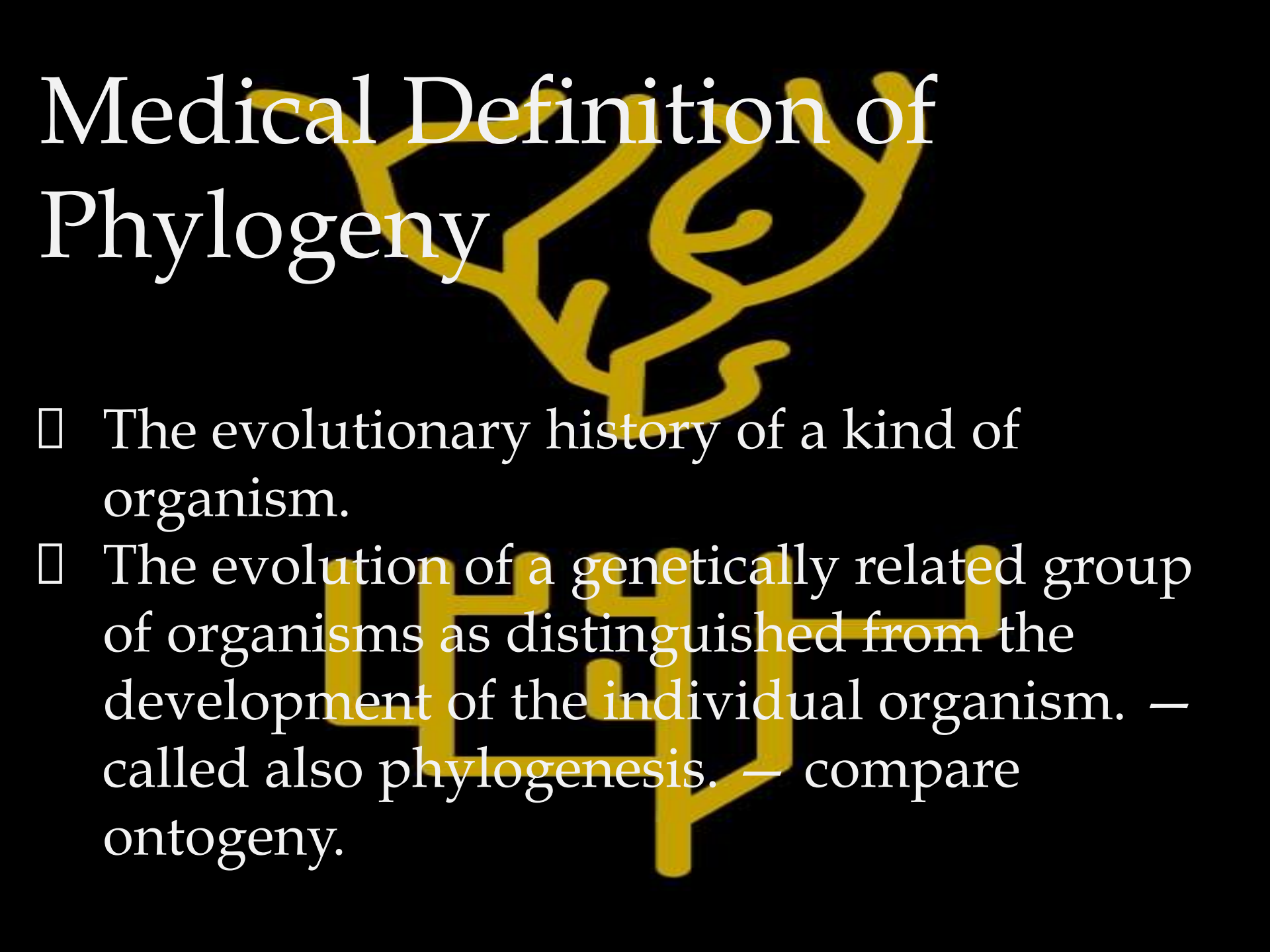
- Fertilization initiates redistribution of cytoplasmic contents within the zygote, so that gradients of cytoplasmic substances exist.
- This results in polarity of the egg: Animal Pole in relatively clear cytoplasm dorsally, Vegetal Pole in yolky region ventrally.
- Cleavage results in separation of cytoplasmic substances previously oriented in gradients within the zygote.

ONTOGENETIC BEHAVIOR

Each organism has a unique life history that contributes to its behavior. Ontogenetic behavior is due to events that occur over the lifetime of an individual. Ontogenetic history builds on species history to determine when, where, and what kind of behavior will occur at a given moment.



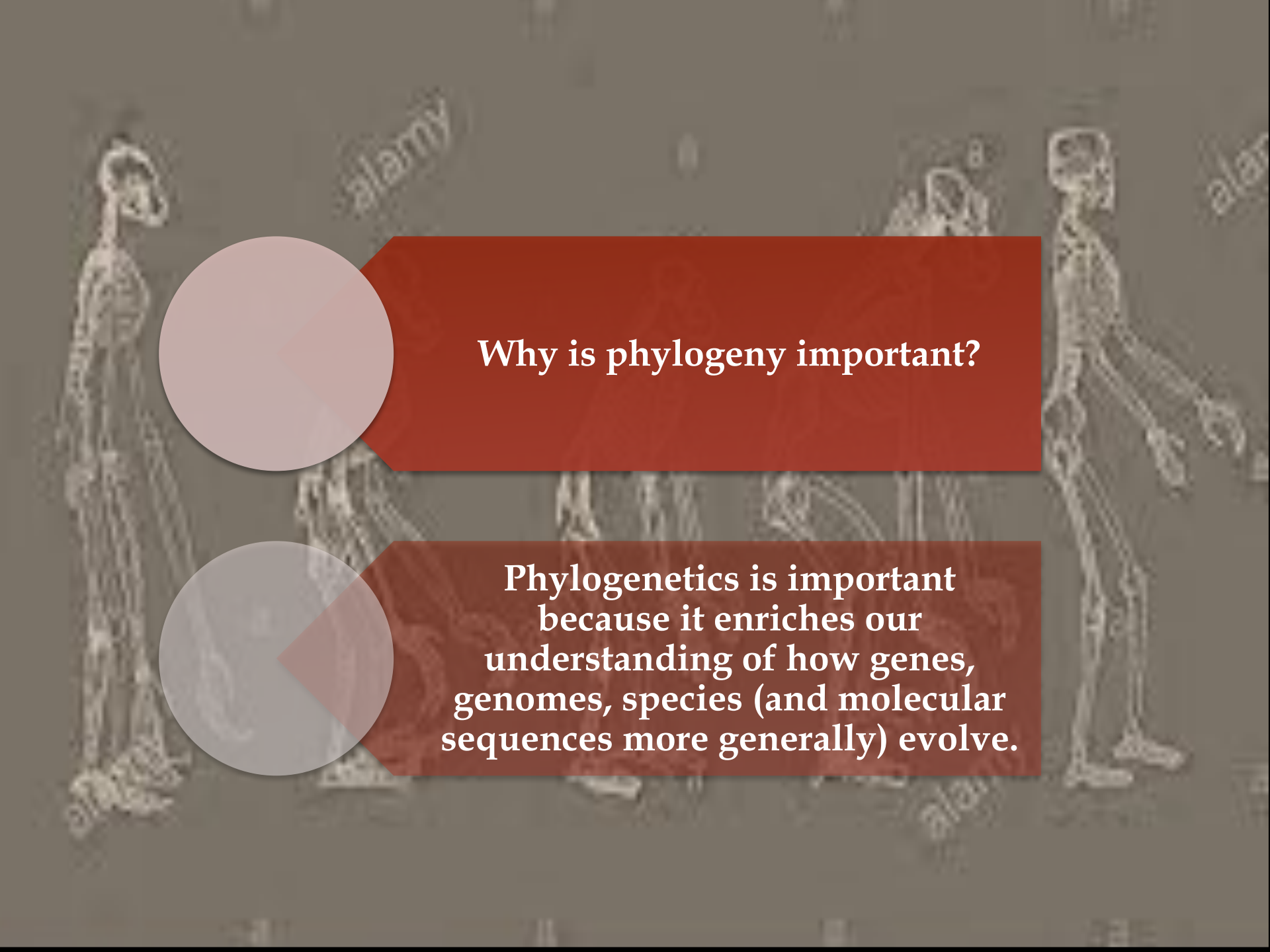
Medical Definition of Phylogeny



- The evolutionary history of a kind of organism.
- The evolution of a genetically related group of organisms as distinguished from the development of the individual organism. — called also phylogenesis. — compare ontogeny.

ONTOGENY VERSUS PHYLOGENY

ONTOGENY	PHYLOGENY
The development or development history of an individual organism	The study of relationships among different groups of organisms and their evolutionary development
Gives the development history of an organism within its own lifetime	Gives the evolutionary history of a species
Describes how a chicken came to life starting from a single cell	Describes the evolutionary process of *Gallus gallus*



Why is phylogeny important?

Phylogenetics is important because it enriches our understanding of how genes, genomes, species (and molecular sequences more generally) evolve.

Relationship between phylogenesis and ontogenesis

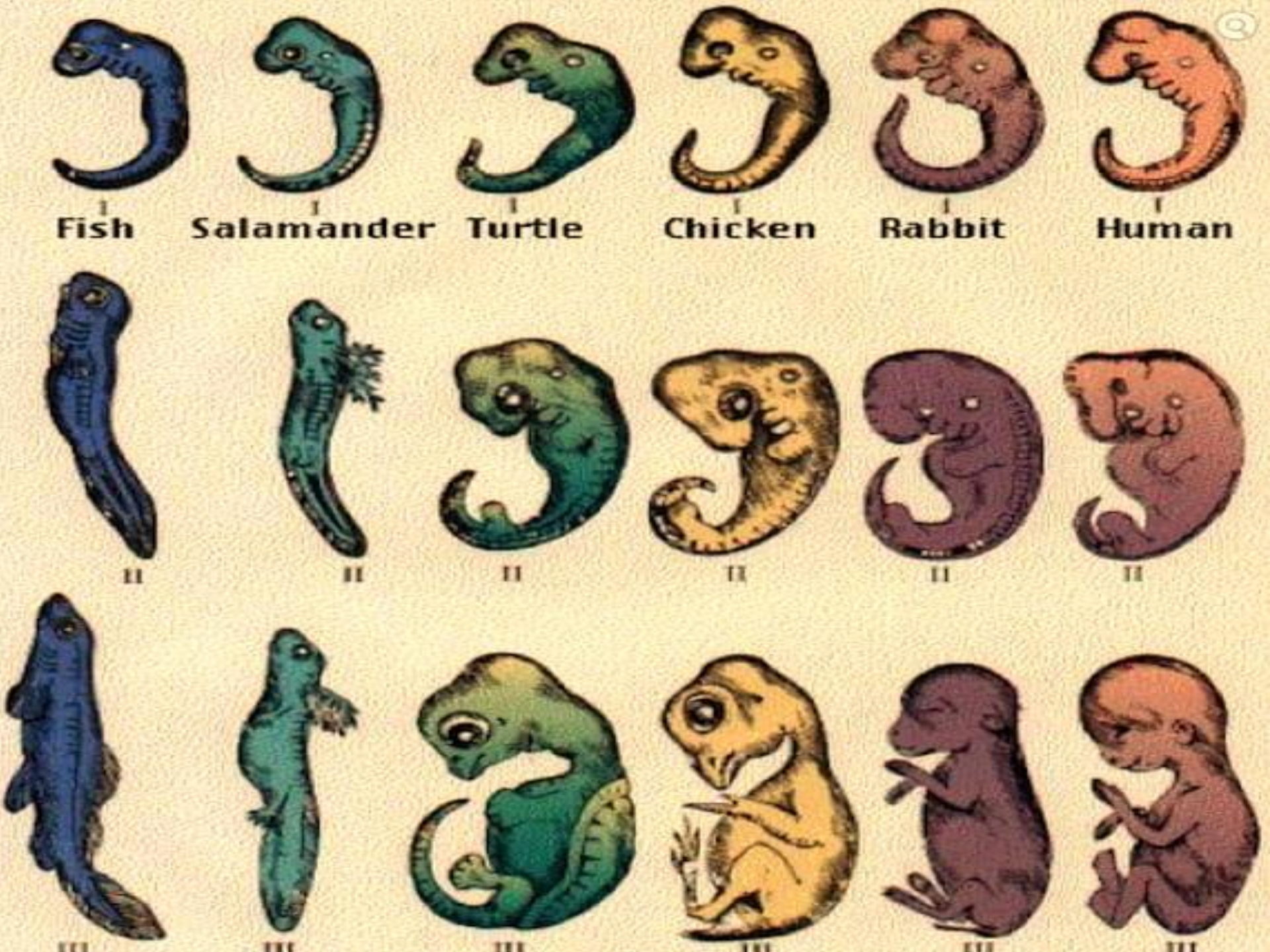
The pharyngeal (branchial) region represents a classic example where the relationship between ontogenesis and phylogenesis has been demonstrated. It is a region where the development of gills during ontogenesis of all chordates has been recapitulated.

GOOP

GOULD

ONTOGENY AND PHYLOGENY

BELKNAP HARVARD


I
Fish
I
Salamander
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Turtle
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Chicken
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Rabbit
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Human
II
II
II
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III
III
III
III
III
III

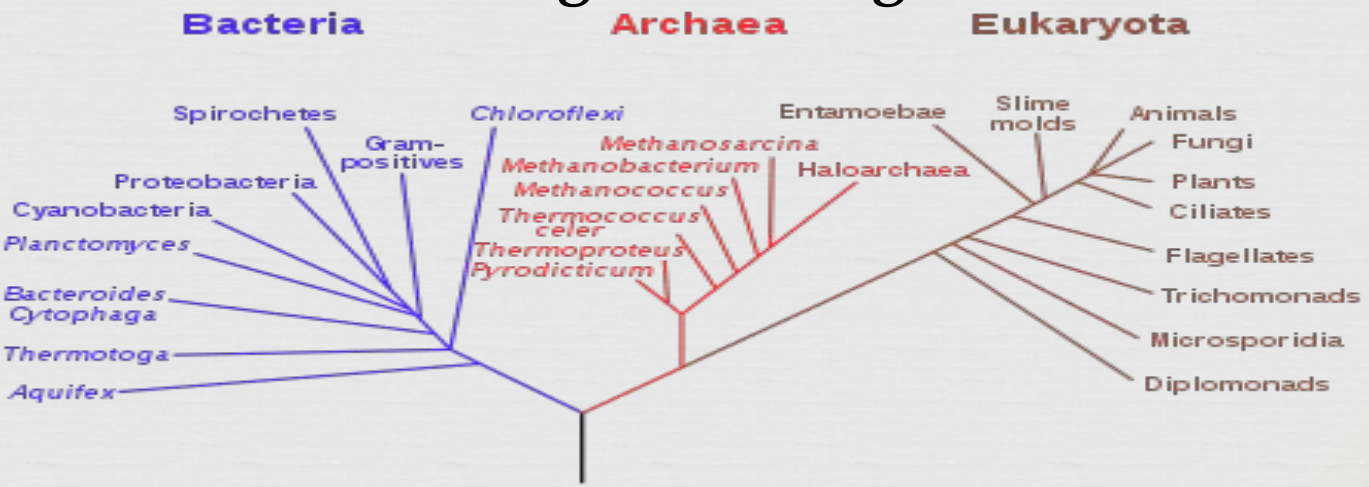
Ontogeny Recapitulates Phylogeny

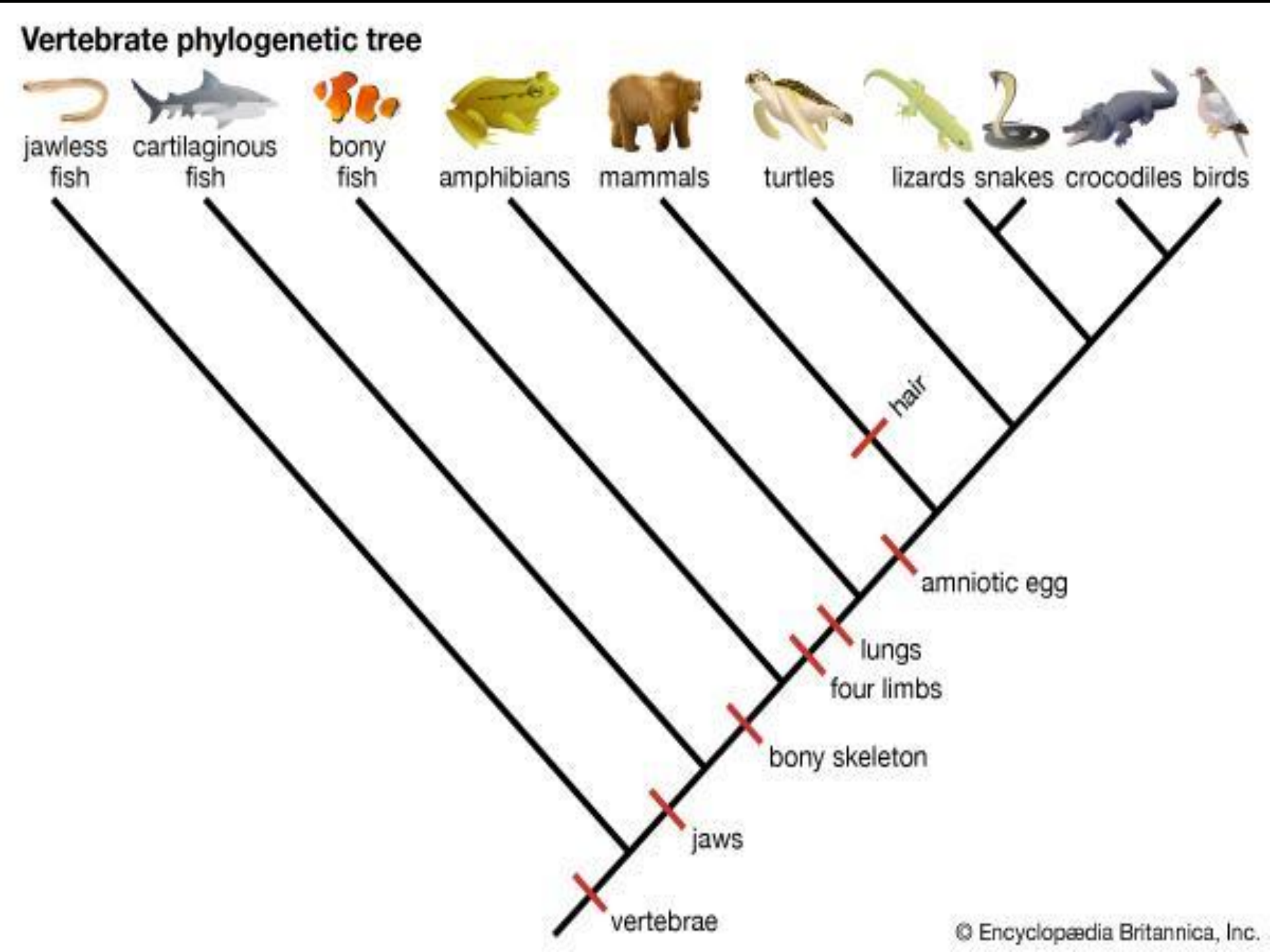
- Hypothesis stated that the embryonic stages of an animal reflect its evolutionary history.
- Viewed evolution as proceeding by adding to pre-existing stages that were preserved in the developmental pattern of the animal.
- Thus mammalian embryonic stages thought to recapitulate its evolutionary stages (e.g., fish, amphibian, and reptile stages).

How does a phylogenetic tree work?

Rules

The root of the tree represents the ancestral lineage, and the tips of the branches represent the descendants of that ancestor. ... When a lineage splits (speciation), it is represented as branching on a phylogeny. When a speciation event occurs, a single ancestral lineage gives rise to two or more daughter lineages.




Vertebrate phylogenetic tree
jawless fish
cartilaginous fish
bony fish
amphibians
mammals
turtles
lizards
snakes
crocodiles
birds
hair
amniotic egg
lungs
four limbs
bony skeleton
jaws
vertebrae
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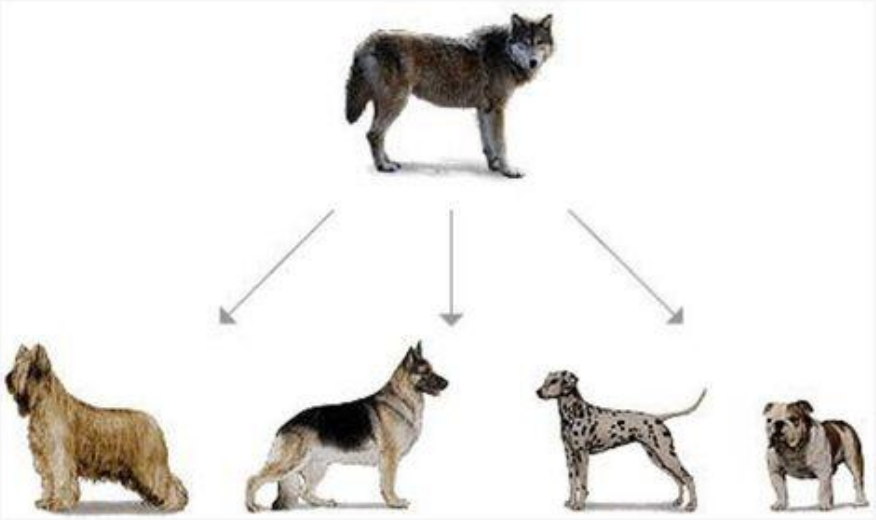
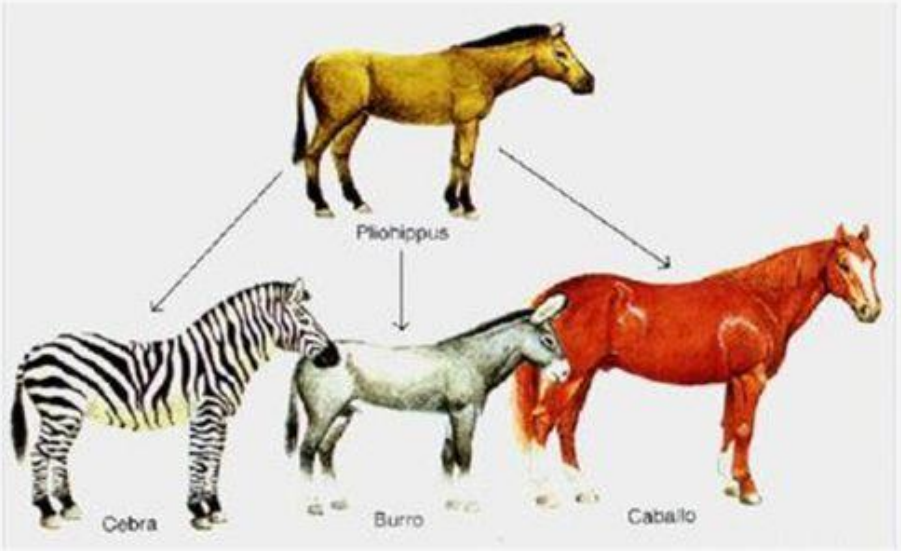
DIVERGENT EVOLUTION

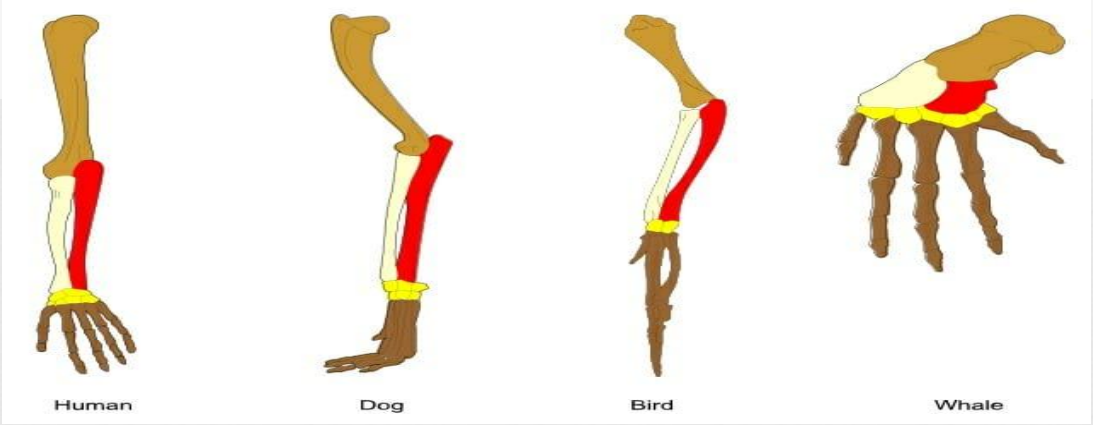
common ancestor (RELATED) → adapt different traits



Example 1: Dog species descend from a wolf



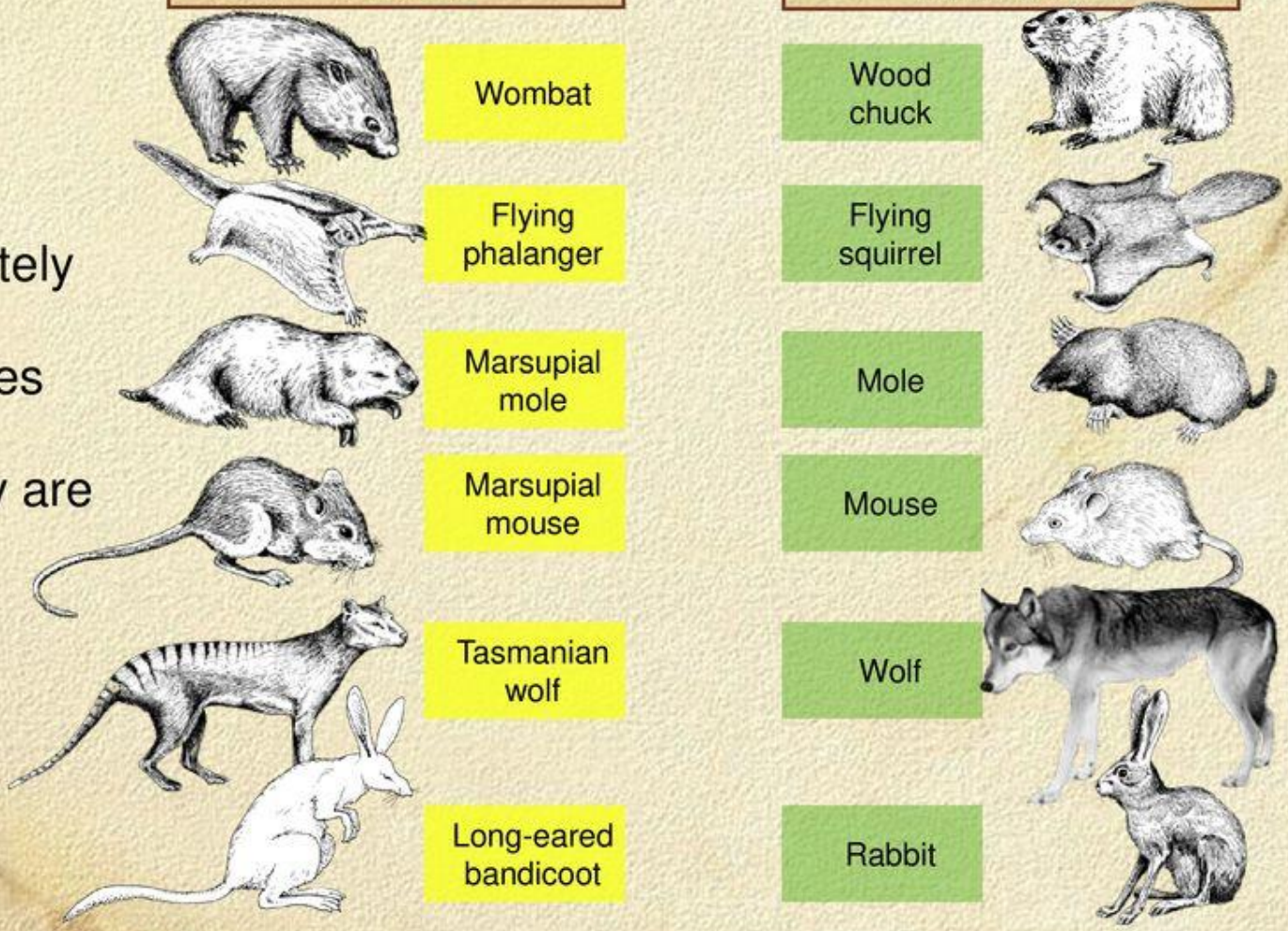
Example 2: Zebras, Donkeys, and Horses are related



Convergent Evolution in Mammals

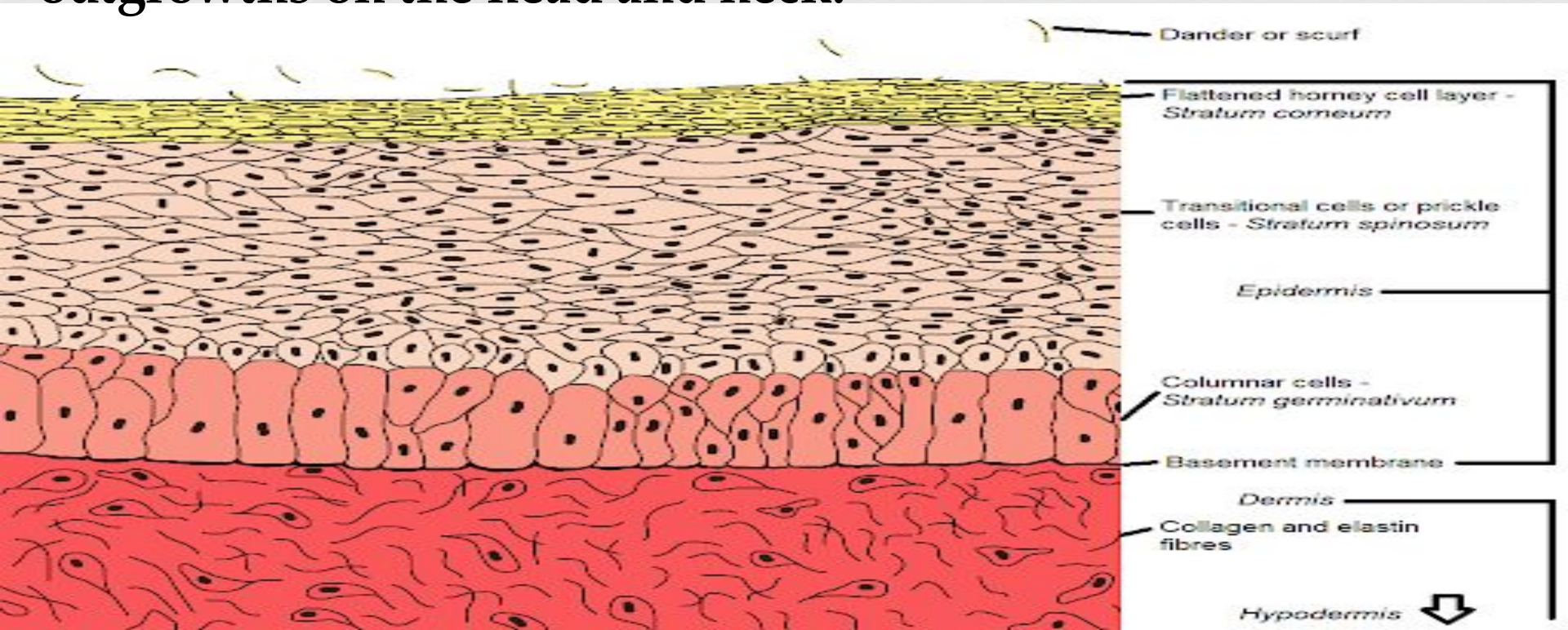
- **Marsupial** and **placental** mammals have evolved separately to occupy equivalent niches on different continents; they are **ecological equivalents**.

Marsupial Mammals Australia	Placental Mammals North America
Wombat	Wood chuck
Flying phalanger	Flying squirrel
Marsupial mole	Mole
Marsupial mouse	Mouse
Tasmanian wolf	Wolf
Long-eared bandicoot	Rabbit



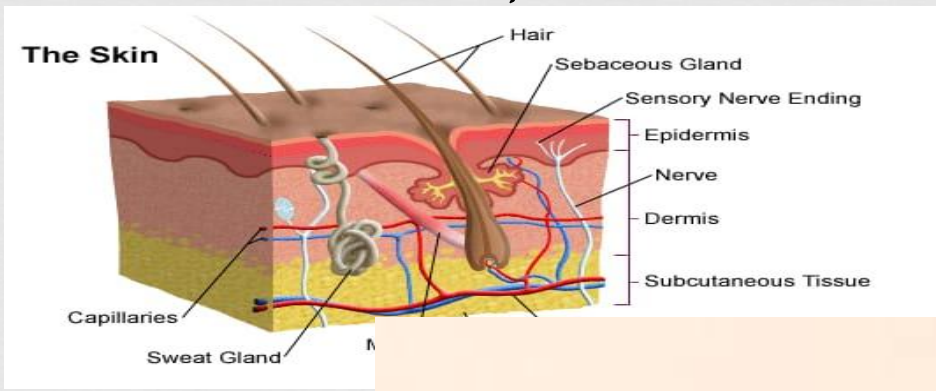
Phylogenesis of the chord avian skin covering -

Its epidermis is both keratinized and lipogenic, and the skin as a whole acts as a sebaceous secretory organ. The skin is covered by feathers over most of the body, but many birds show colored bare skin or integumentary outgrowths on the head and neck.



developmental disorders of the skin coverings in human

- **All mammals are endothermic ,vertebrates that have hair ,nails and produce milk to feed their young .**
- **Skin called an epidermis covers the mammals endoskeleten .**



referance

- https://youtu.be/OgLsLC28xA
- https://youtu.be/6_XMKmFQ_w8
- https://youtu.be/dOKg18q4gLo
- https://youtu.be/X-XtZyHcck4
- https://youtu.be/oXKRCG-3z9k


Thank you
For
Attention