

Is a hippopotamus more closely related to a pig or to a whale?



# HIPPO → WHALE

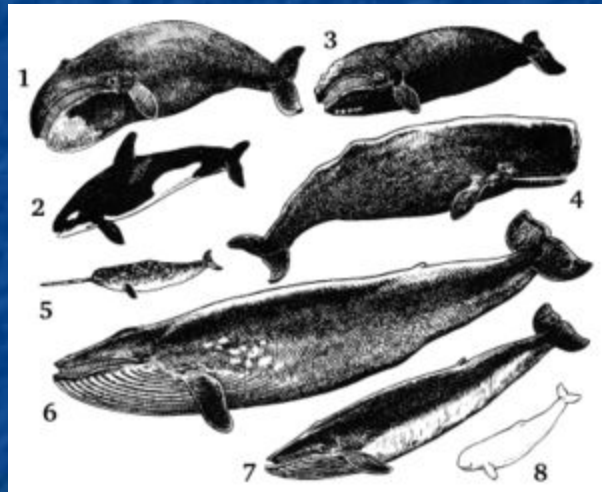


Based on physical comparisons (particularly dental structure and number of toes) it was originally thought that hippos were most closely related to pigs but DNA analysis indicates that hippos are more closely related to whales!



# Evolutionary Link

- Whales and hippos had a common water-loving ancestor 50 to 60 million years ago that evolved and split into two groups:

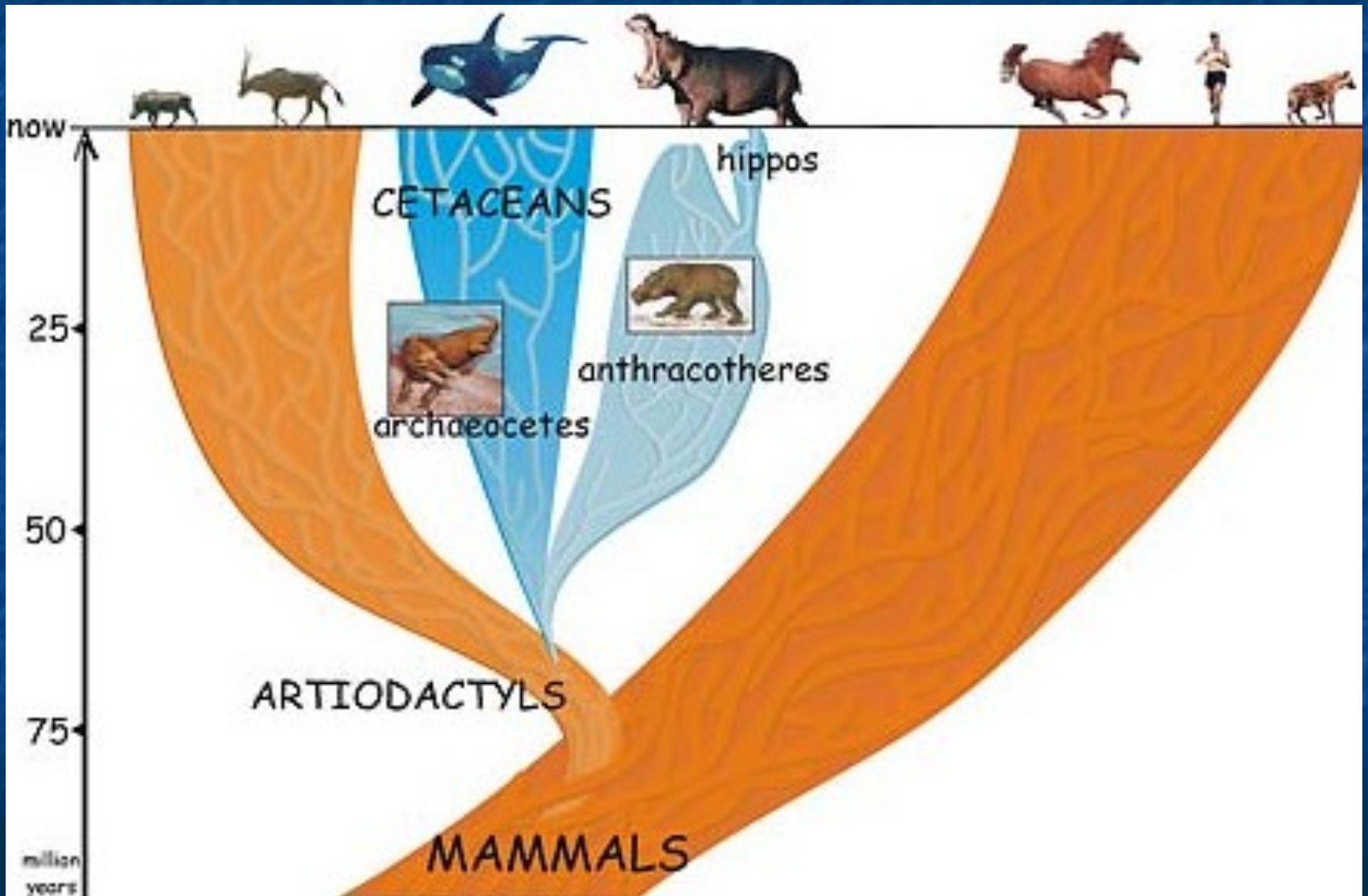


The cetaceans (whales, dolphins, and porpoises)



The pig-like anthracotheres – died out less than 2.5 million years ago, leaving only the hippo as a descendent

# Cladogram



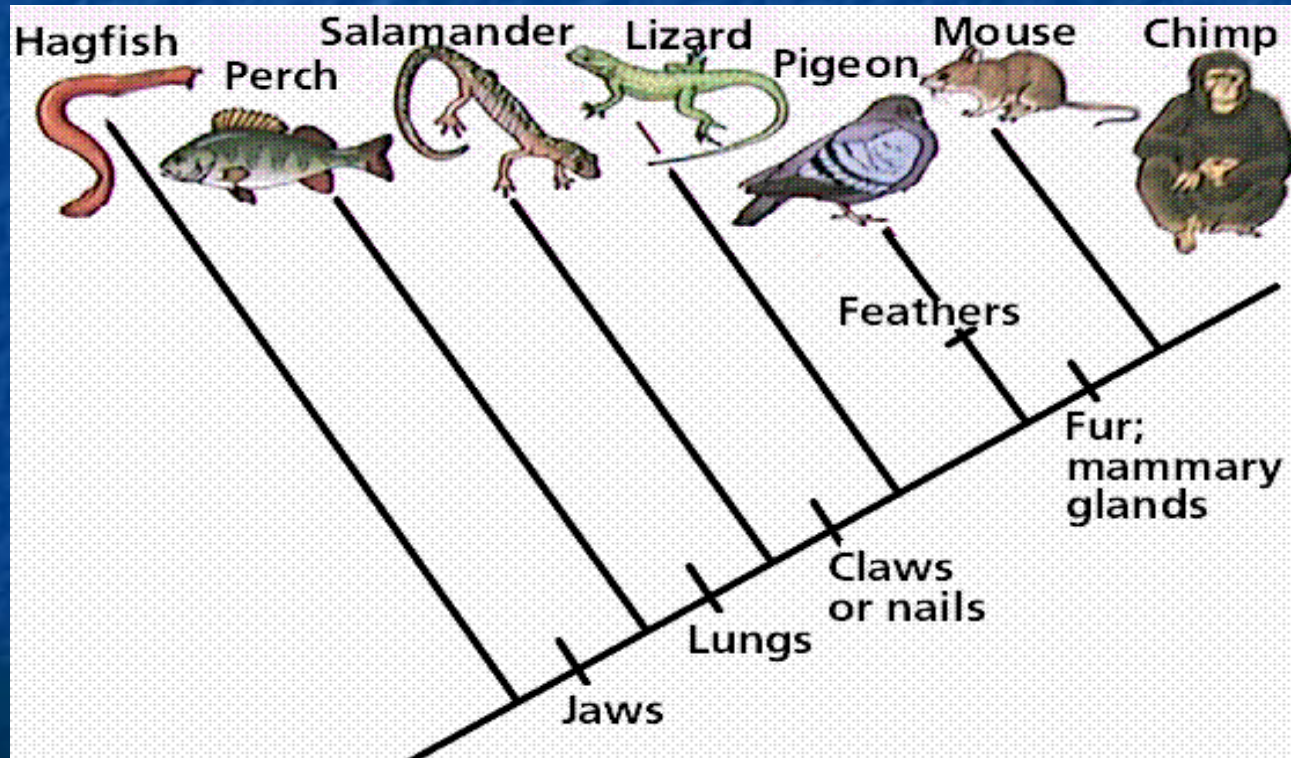


# Cladograms are used to...

- Organize organisms based on evolutionary relationships (phylogeny).
- In other words...who is related to who and where did we come from...

# How are cladograms constructed?

- Organisms are grouped together based on their shared derived characteristics (trait modified from the ancestral trait).





# Cladogram construction

- Given a table of derived characters (traits), create a cladogram

## Taxa

Characters	Shark	Bullfrog	Kangaroo	Human
Vertebrae	X	X	X	X
Two pairs of limbs		X	X	X
Mammary glands			X	X
Placenta				X

# Step 1 – Create a Venn Diagram

- How many organisms are you comparing?
  - This number will equal the number of circles in your Venn diagram.
- Now count the number of characters each organism has.
  - This will be the order that you place the organisms in the Venn Diagram.



# Venn Diagram

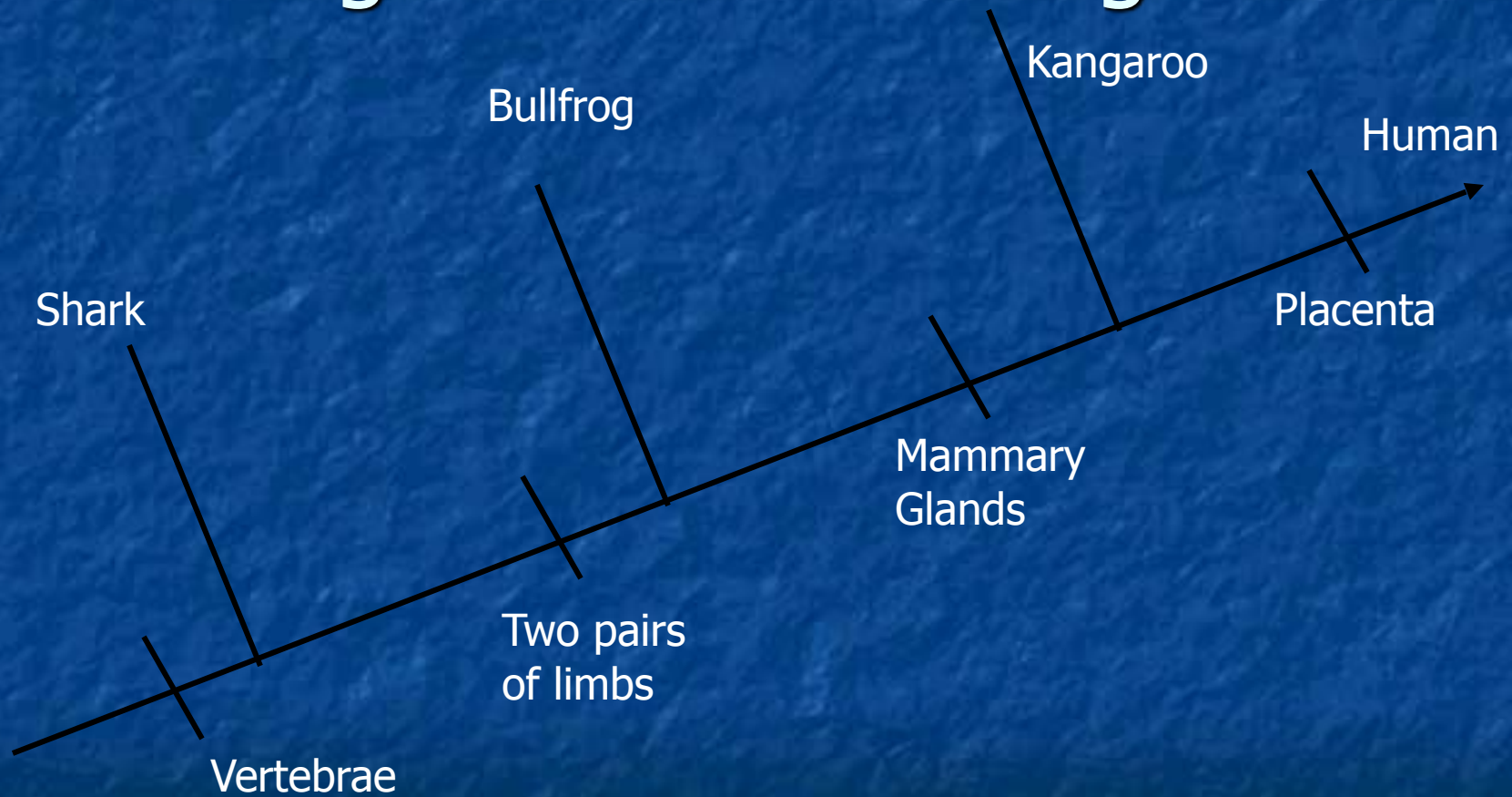
**Placenta: Human**

**Mammary glands: Kangaroo**

**Two pairs of limbs: Bullfrog**

**Vertebrae: Shark**

# Step Two – Convert the Venn Diagram into a Cladogram





Character	Earthworm	Trout	Lizard	Human
Vertebrae		X	X	X
Legs			X	X
Hair				X

Character	Earthworm	Trout	Lizard	Human
Vertebrae		X	X	X
Legs			X	X
Hair				X

