

The Species Concept

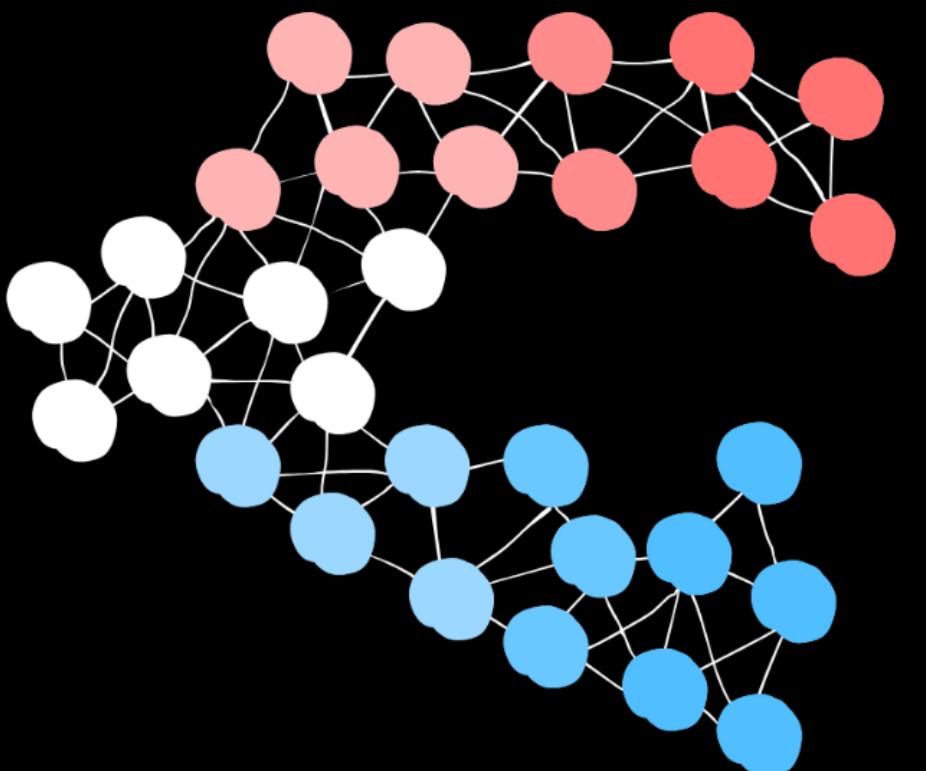
Raphaël Scherrer

What is a species?

biological species concept

“groups of actually or potentially interbreeding natural populations which are reproductively isolated from other such groups”

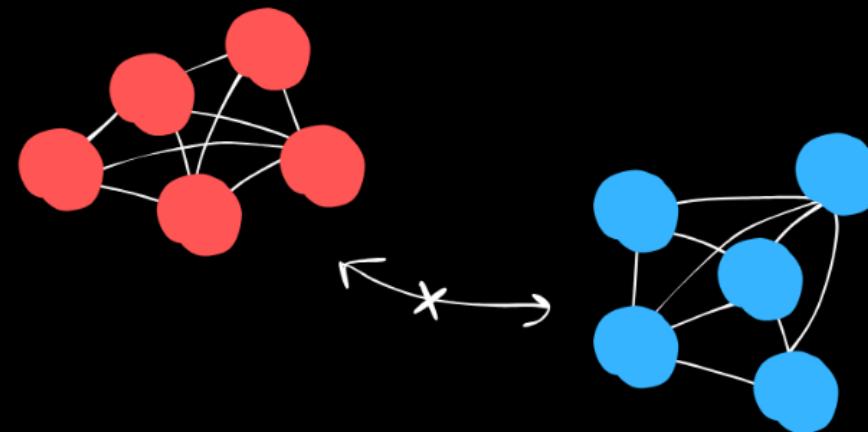
Mayr (1969)



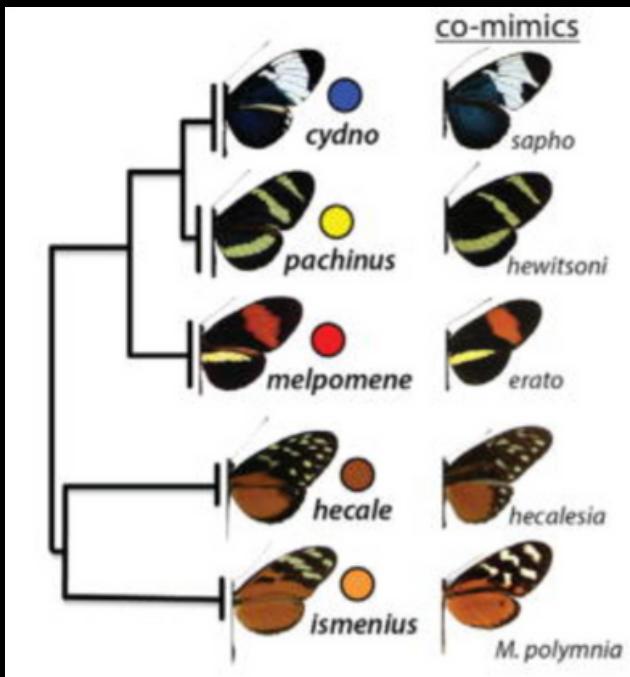
Ernst Mayr



Meyer (2005)



sterile hybrids



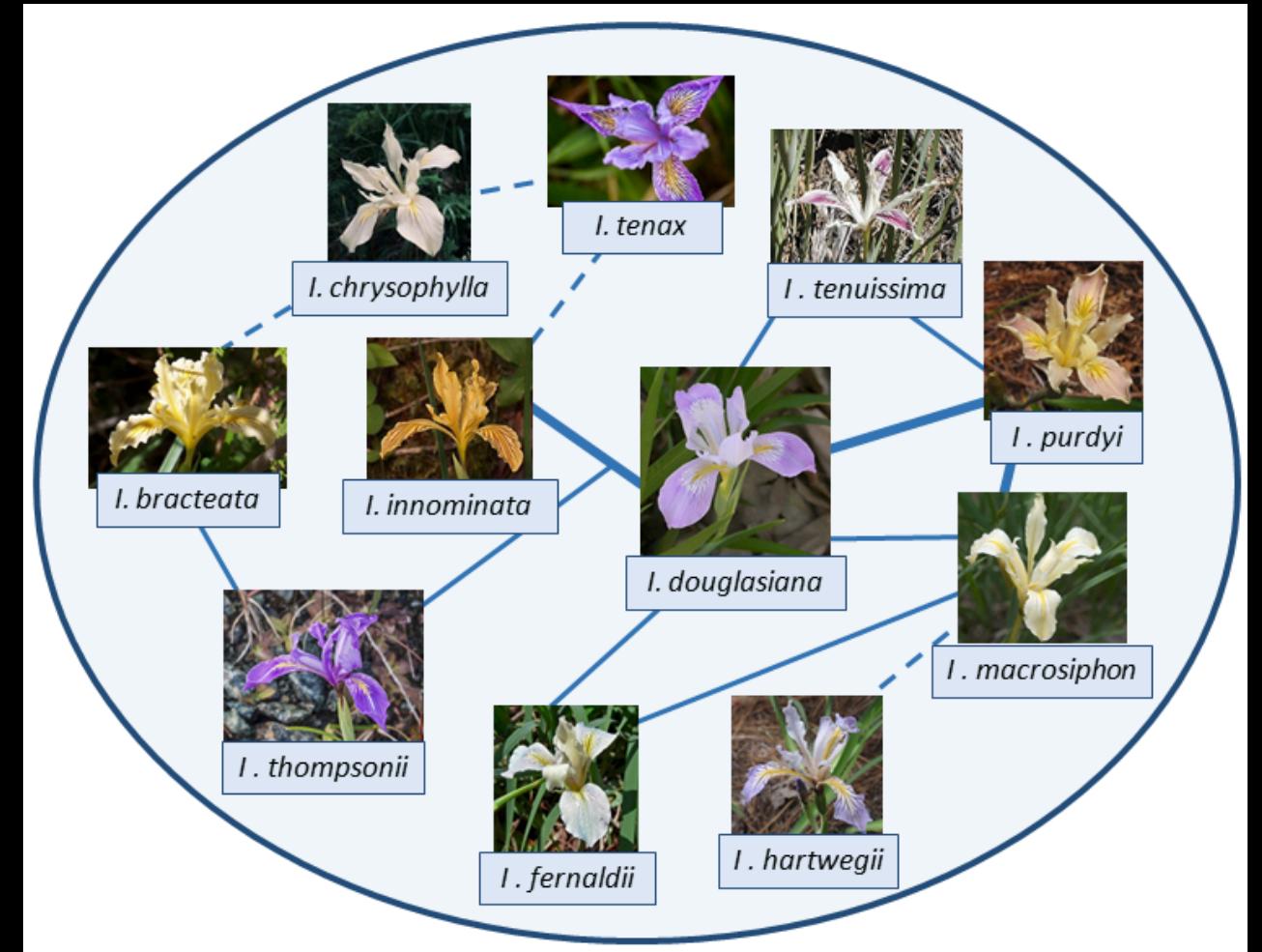
Kronforst (2013)



Grant and Grant (1992)

(semi-)fertile
hybrids

syngameon

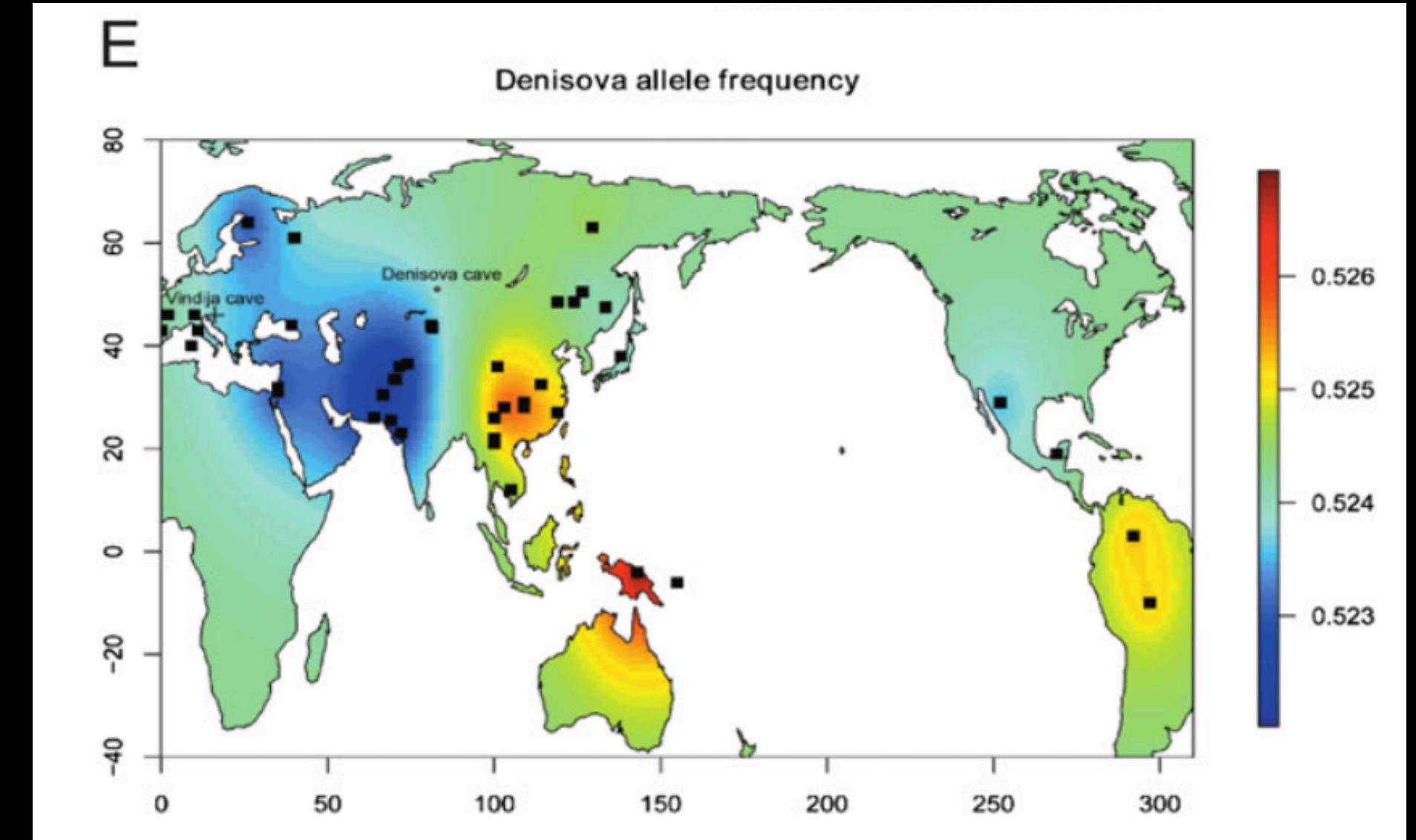
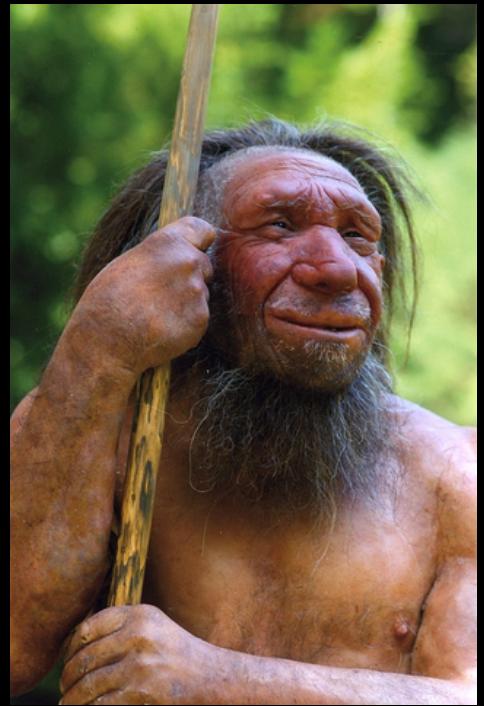


Boecklen (2017)

hybridization

genetic introgression

Neanderthals



Home » Human Evolution Evidence » Genetics » Ancient DNA And Neanderthals

Ancient DNA and Neanderthals

<https://humanorigins.si.edu/evidence/genetics/ancient-dna-and-neanderthals>

Reilly et al. (2022)

Denisovans

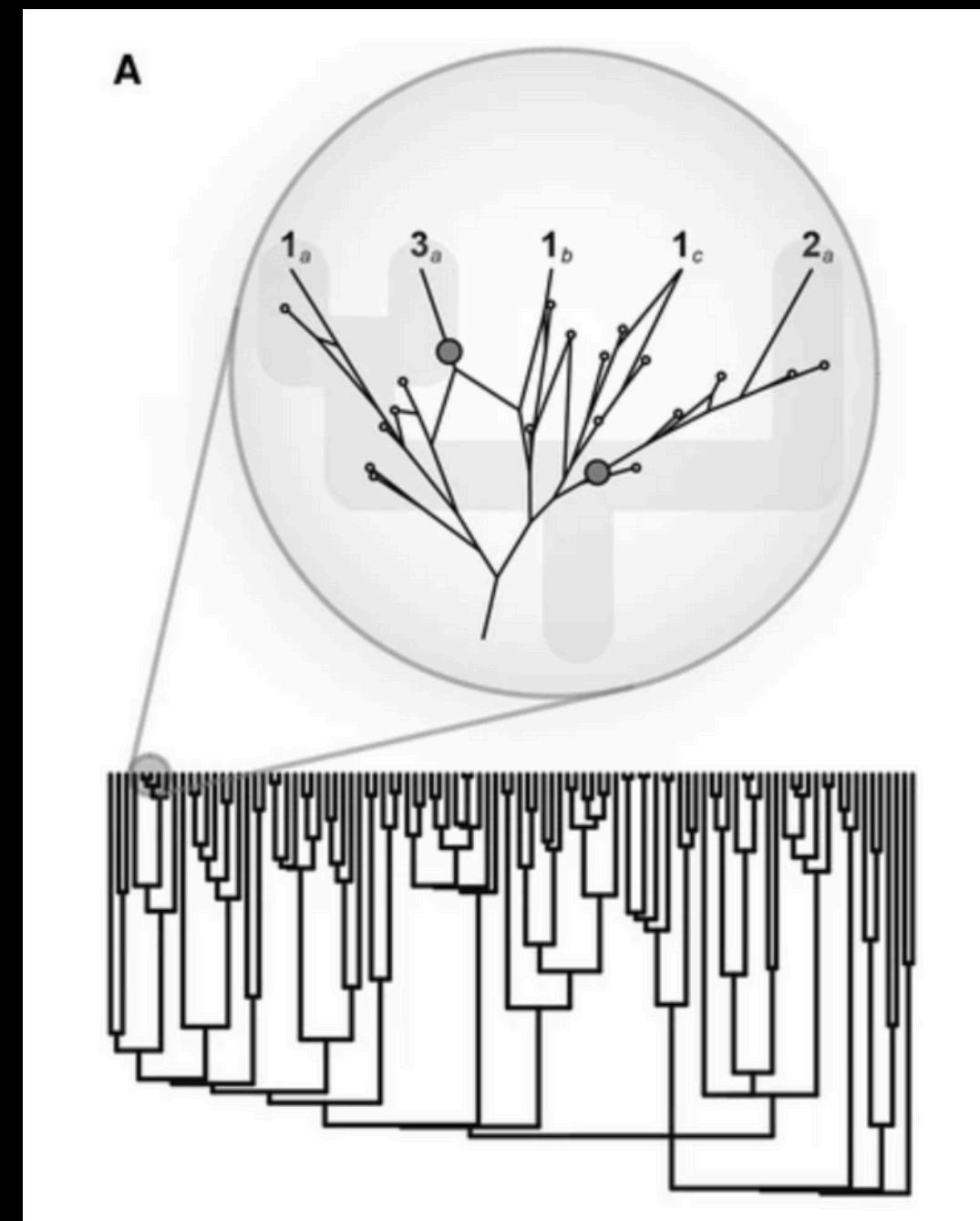
BioEssays

Insights & Perspectives |  Open Access |  

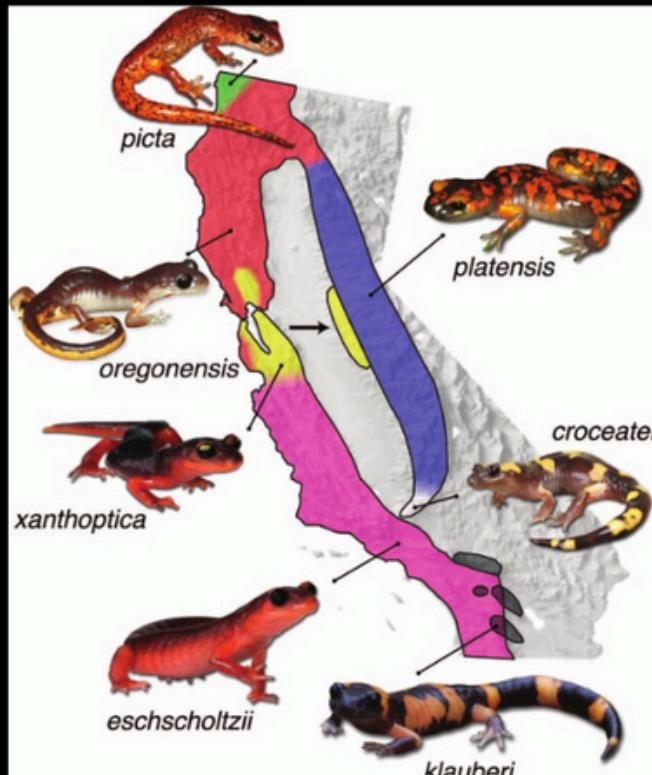
How reticulated are species?

James Mallet , Nora Besansky, Matthew W. Hahn

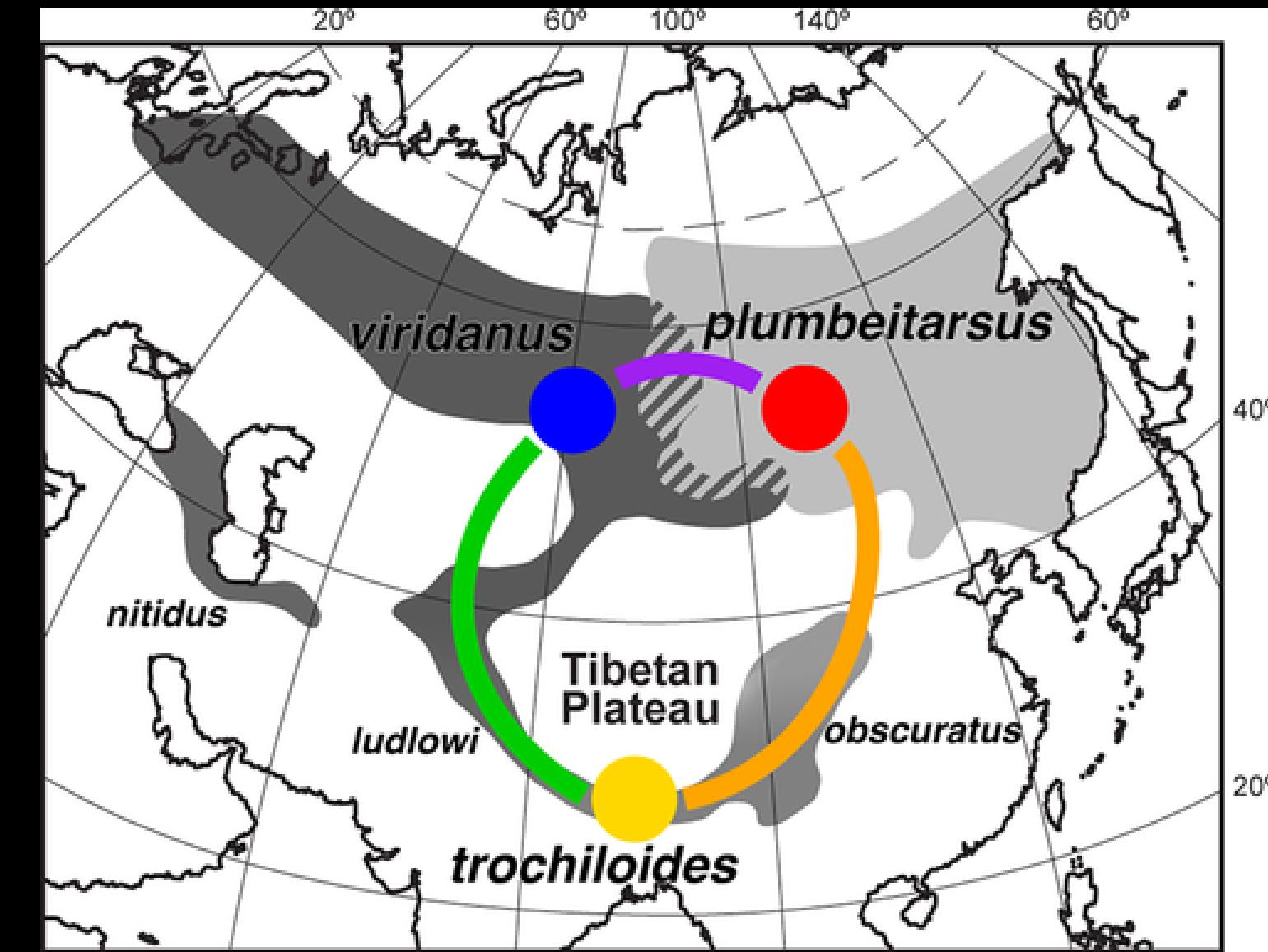
Mallet et al. (2015)



ring species



Kuchta and Wake (2016)



Irwin et al. (2016)

Are species real?

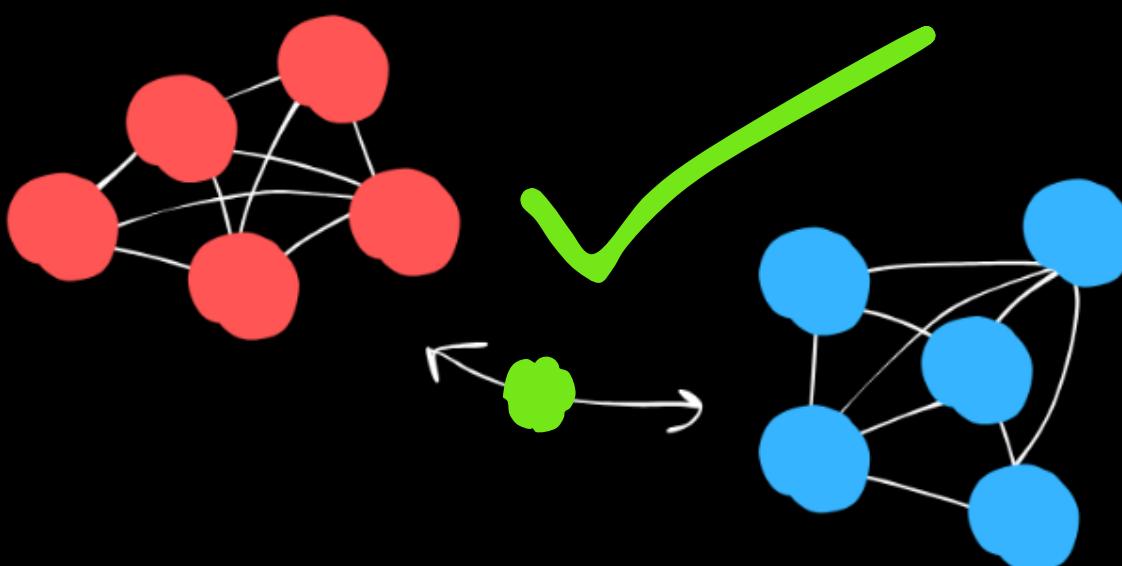
genotypic cluster species concept

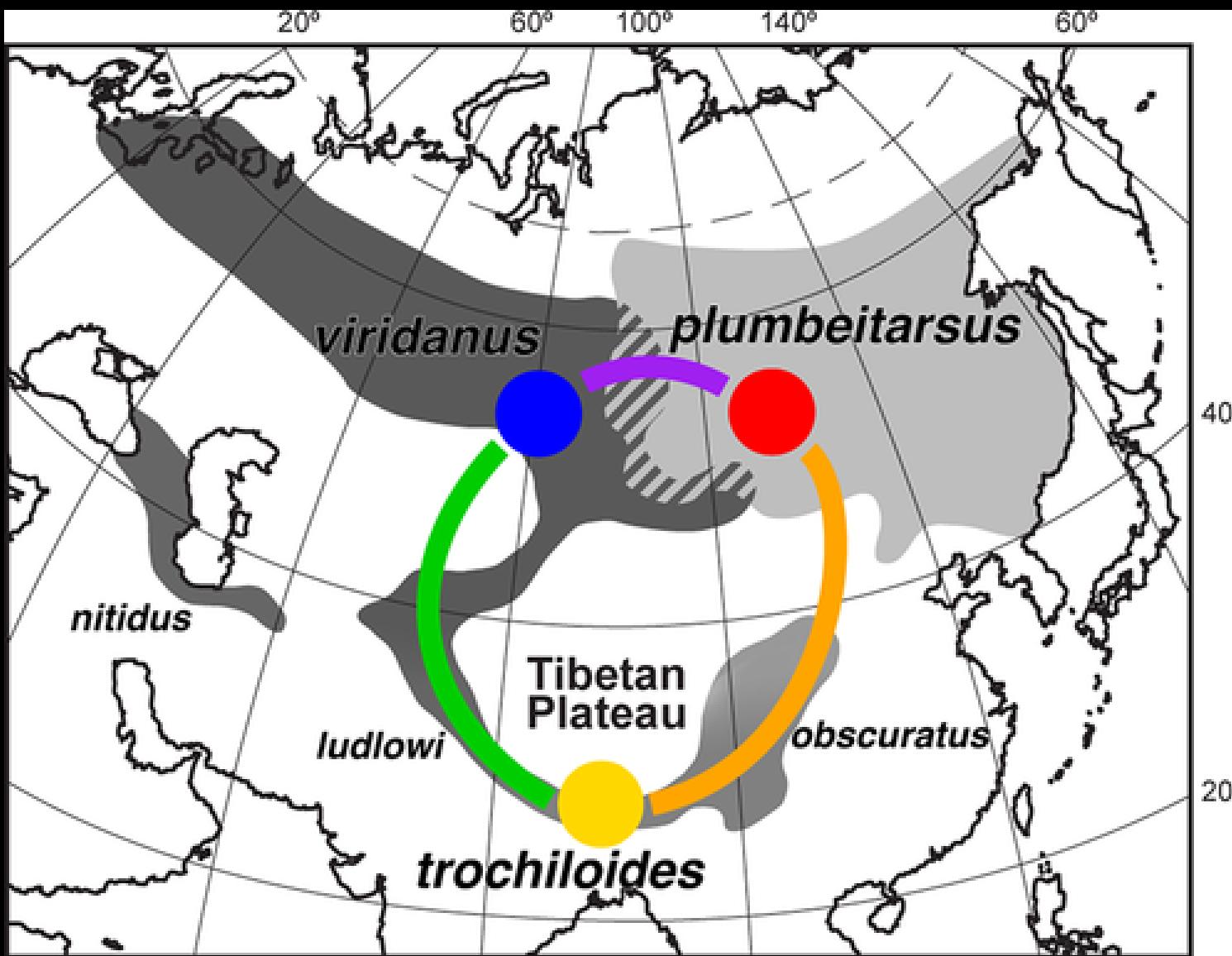
“genetically distinguishable group of individuals that has few or no intermediates when in contact with other such clusters”

Coyne and Orr (2004)

A species definition for the Modern Synthesis

Mallet (1995)

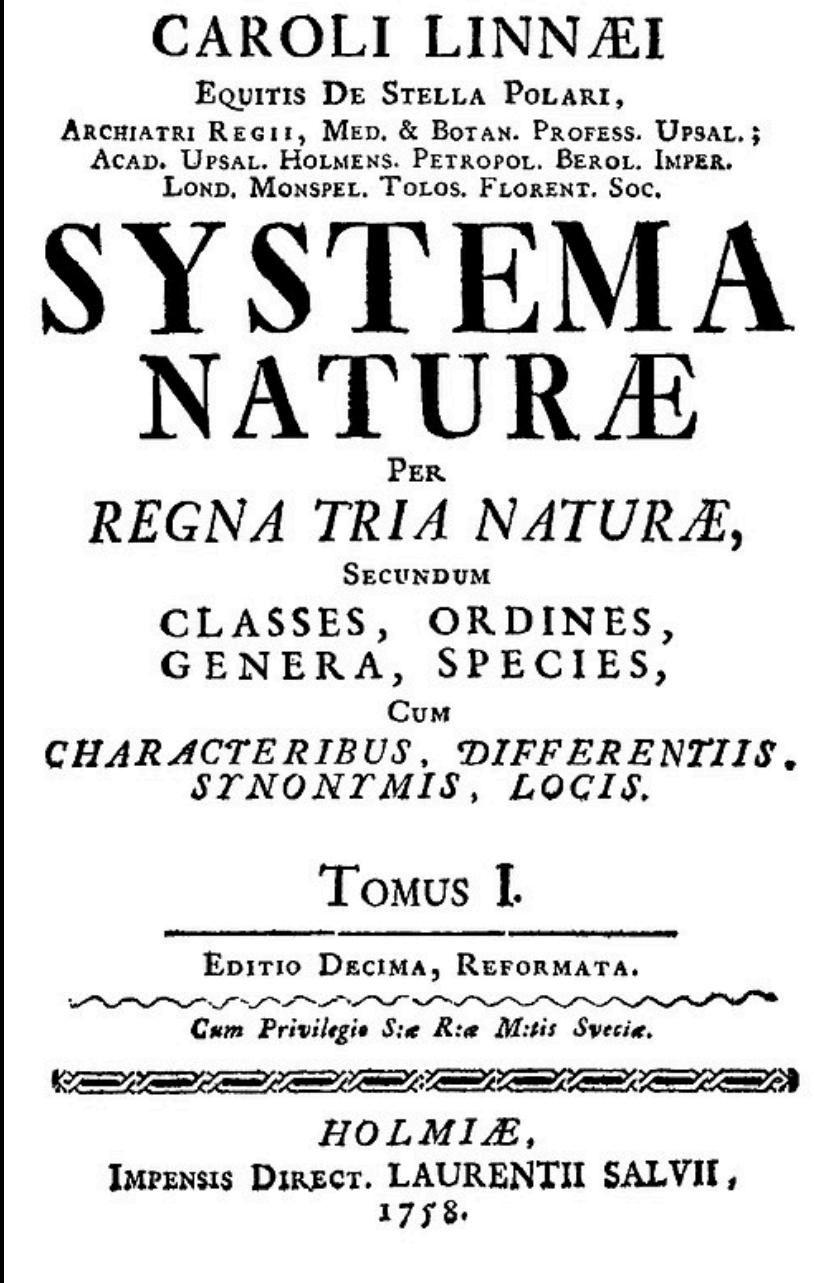




taxonomic levels

phylum	Chordata
class	Mammalia
order	Primates
family	Hominidae
genus	<i>Homo</i>
species	<i>Homo sapiens</i>

systematics



Linnaeus (1758)

folk classification



Rofaifo (New Guinea)



Lin and Han (2024)

Dwyer (1976), Coyne and Orr (2004)

Reptiles



Fish



traditional
vertebrate classes

Birds



Mammals



Amphibians





Carl von Linné (1707-1778)

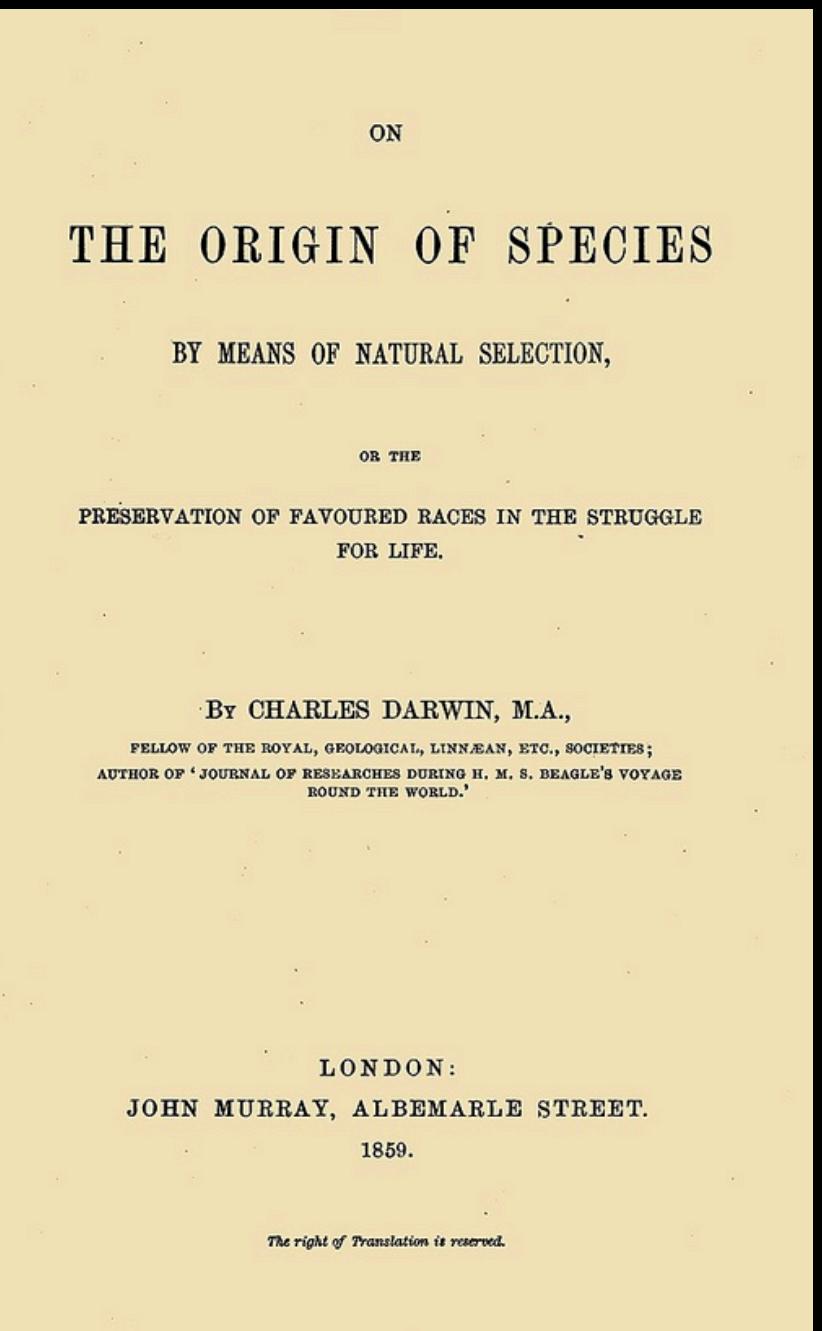
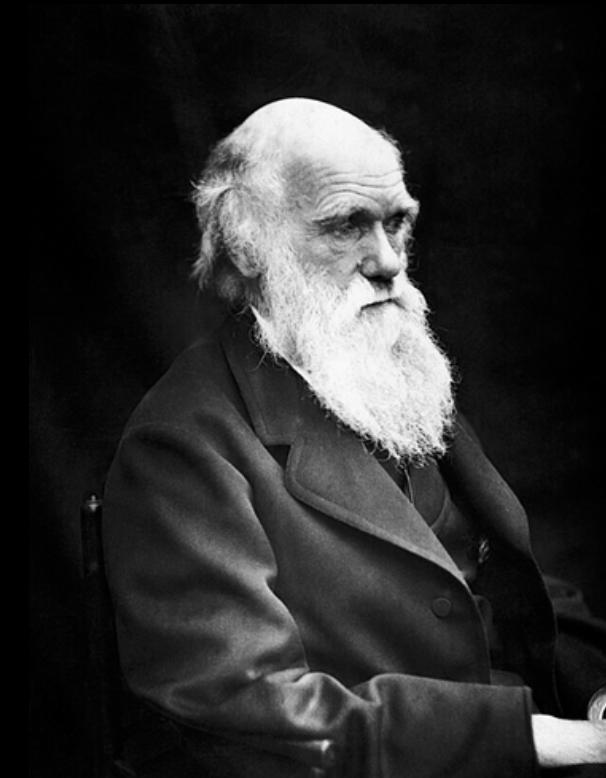
binomial nomenclature

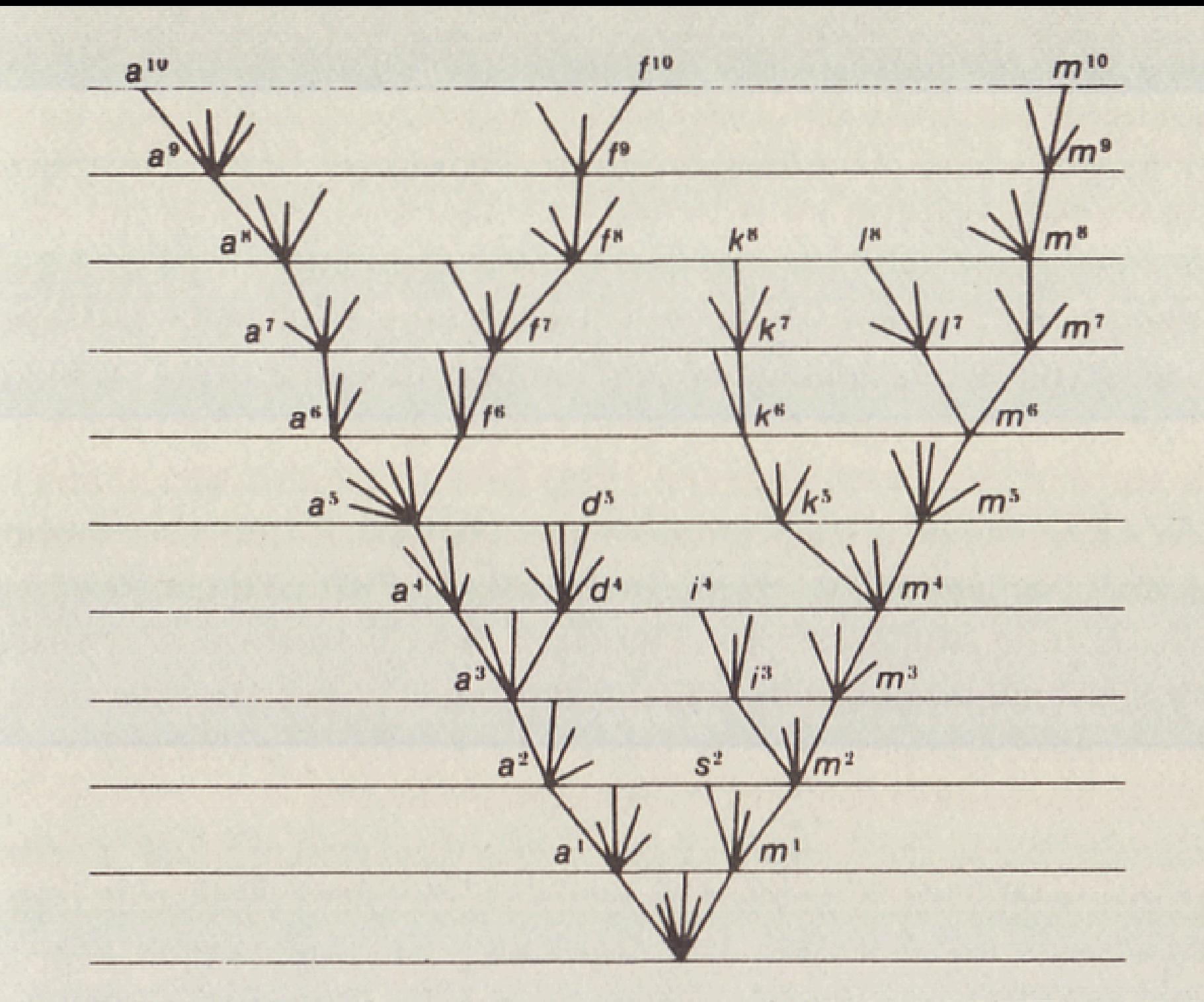
Homo sapiens

Canis lupus

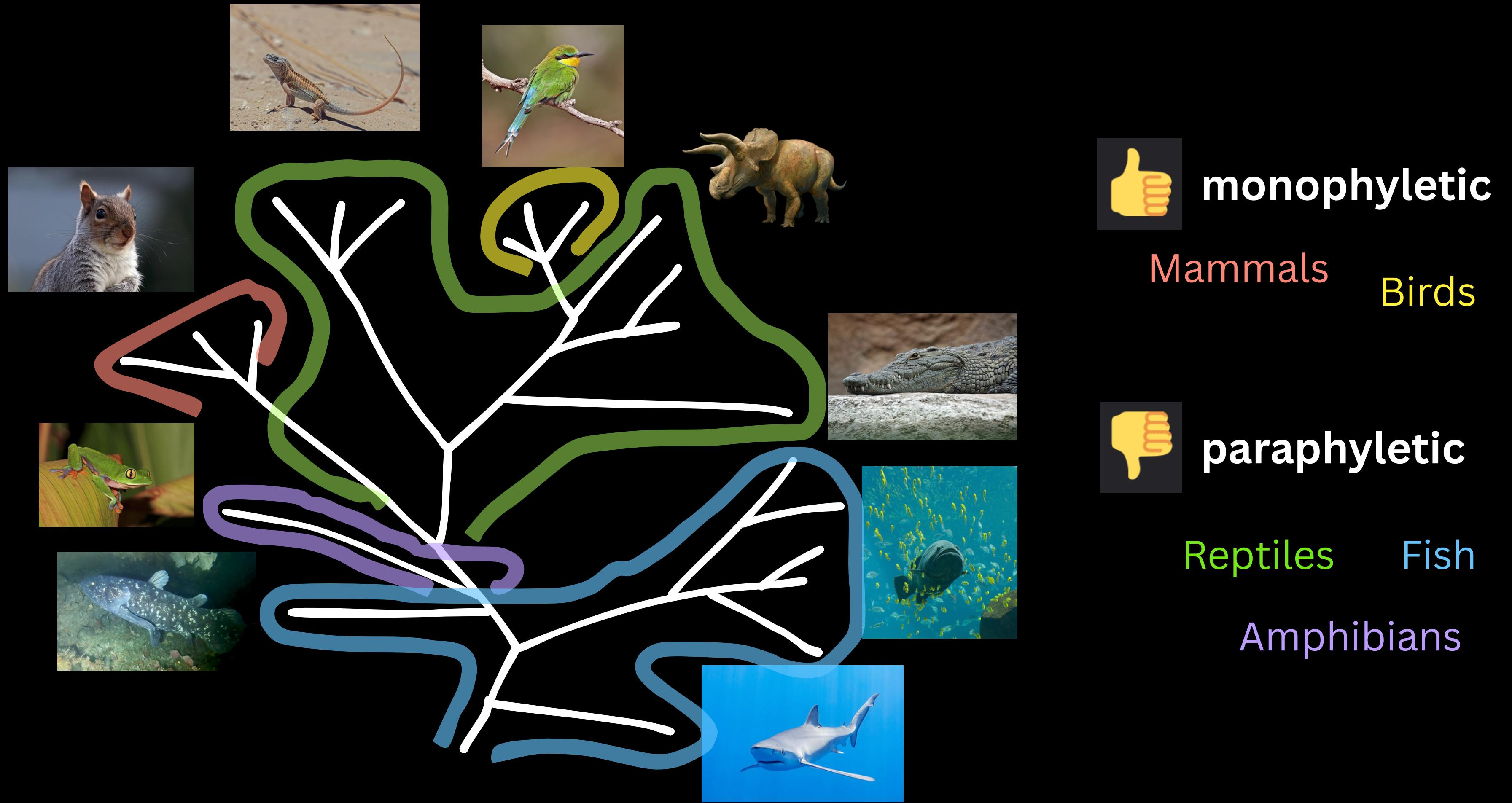
Ursus arctos

Darwin (1859)





Darwin (1859)



Evans (2009)

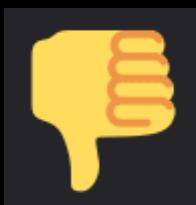
“Pachyderms”



Perissodactyla



Afrotheria



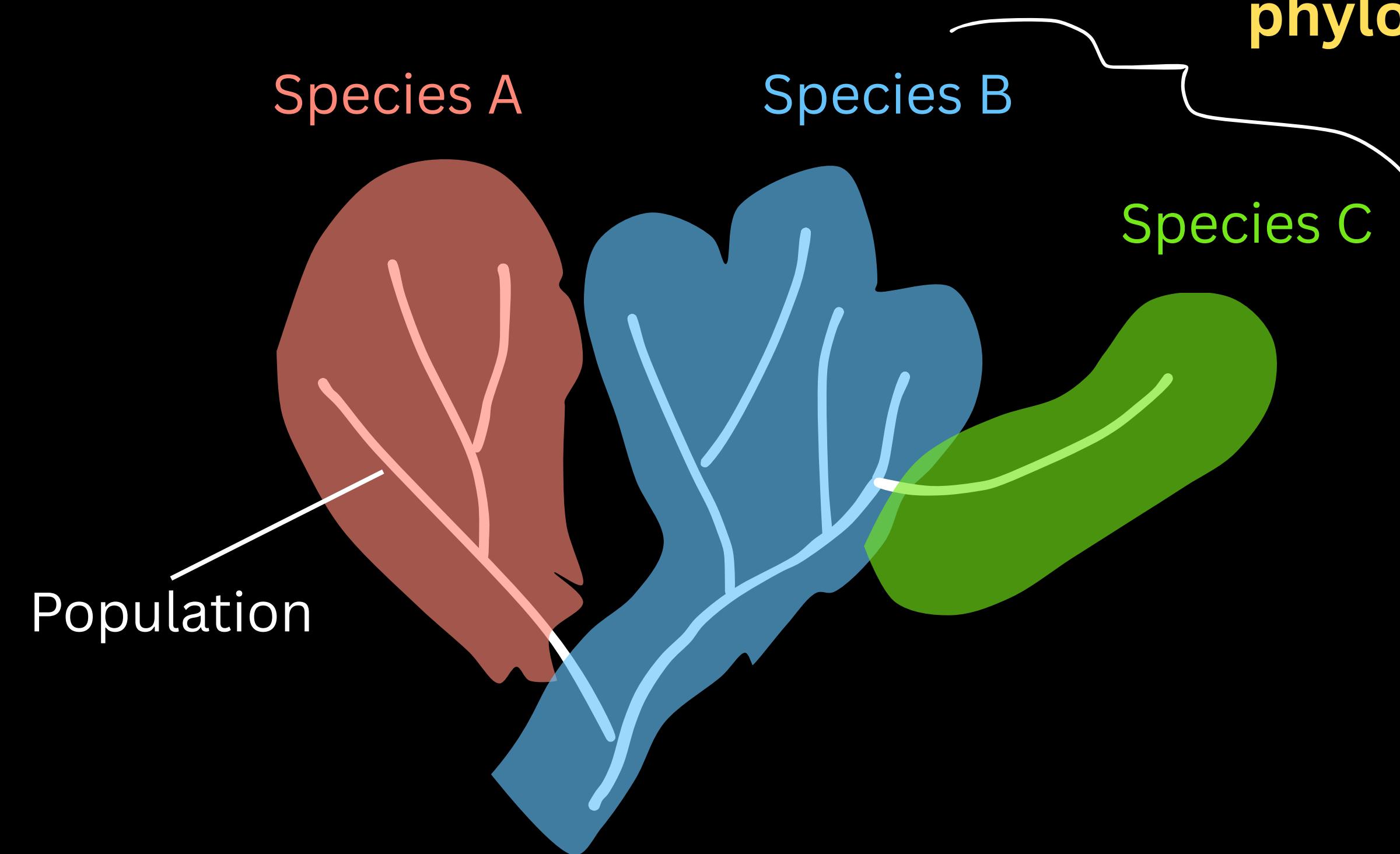
polyphyletic

Cetartiodactyla



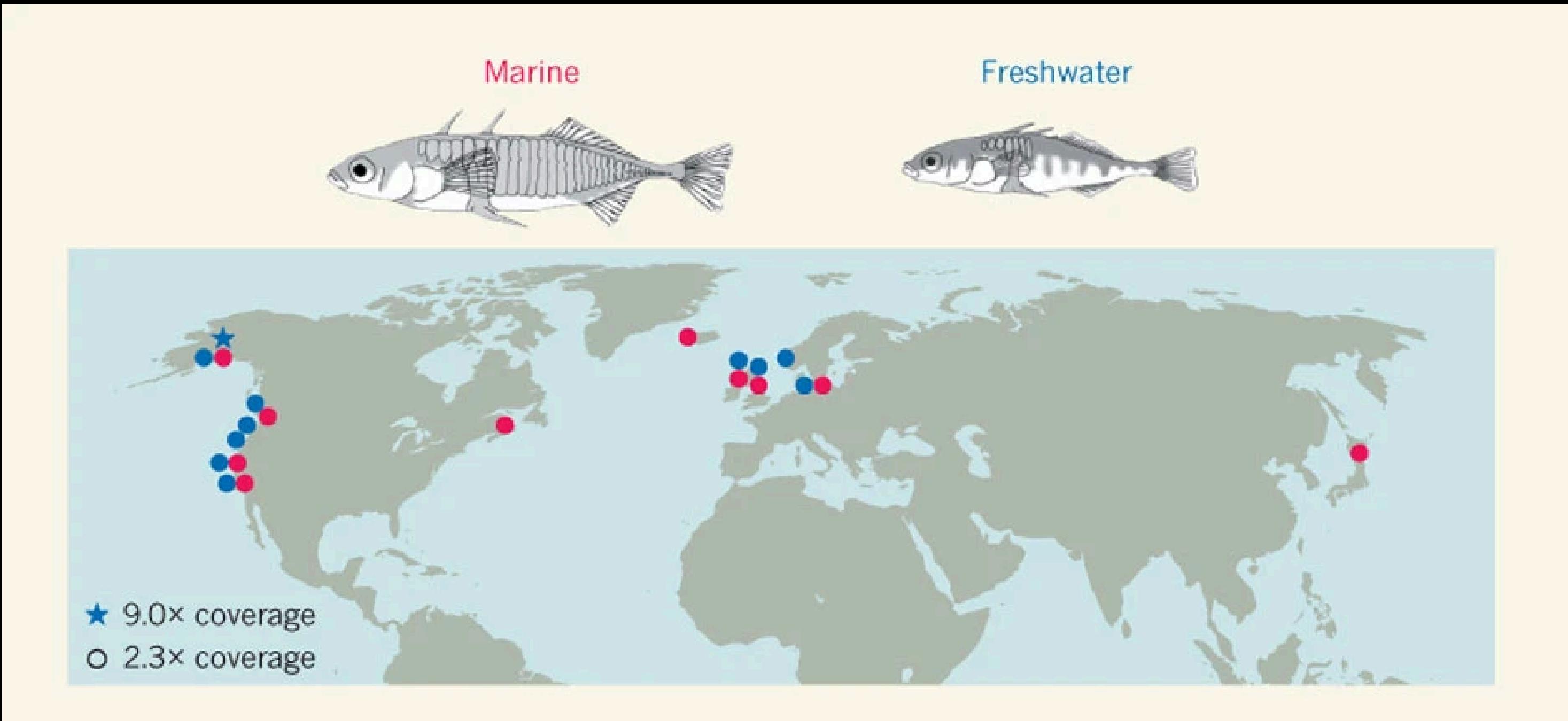
Shoshani and McKenna (1998)

phylogenetic species concept



Baum and Donoghue (1995), Coyne and Orr (2004)

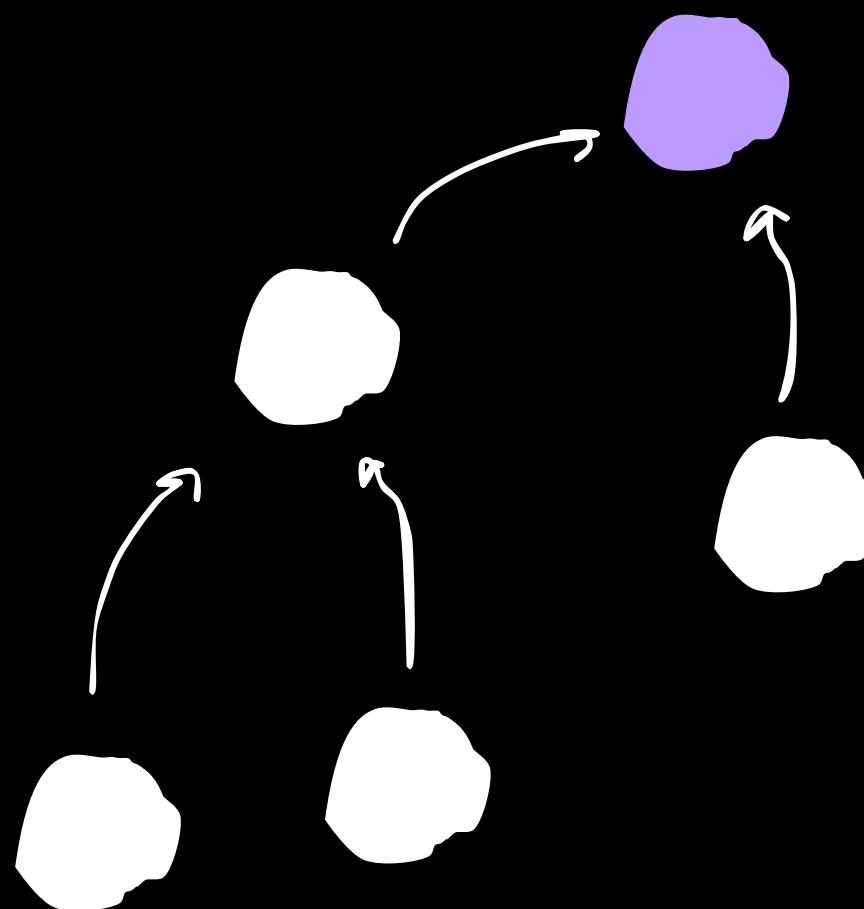
parallel speciation



Hoekstra (2012)

polyploid speciation

Species B



Species A

Coyne and Orr (2004)



Levy and Feldman (2022)

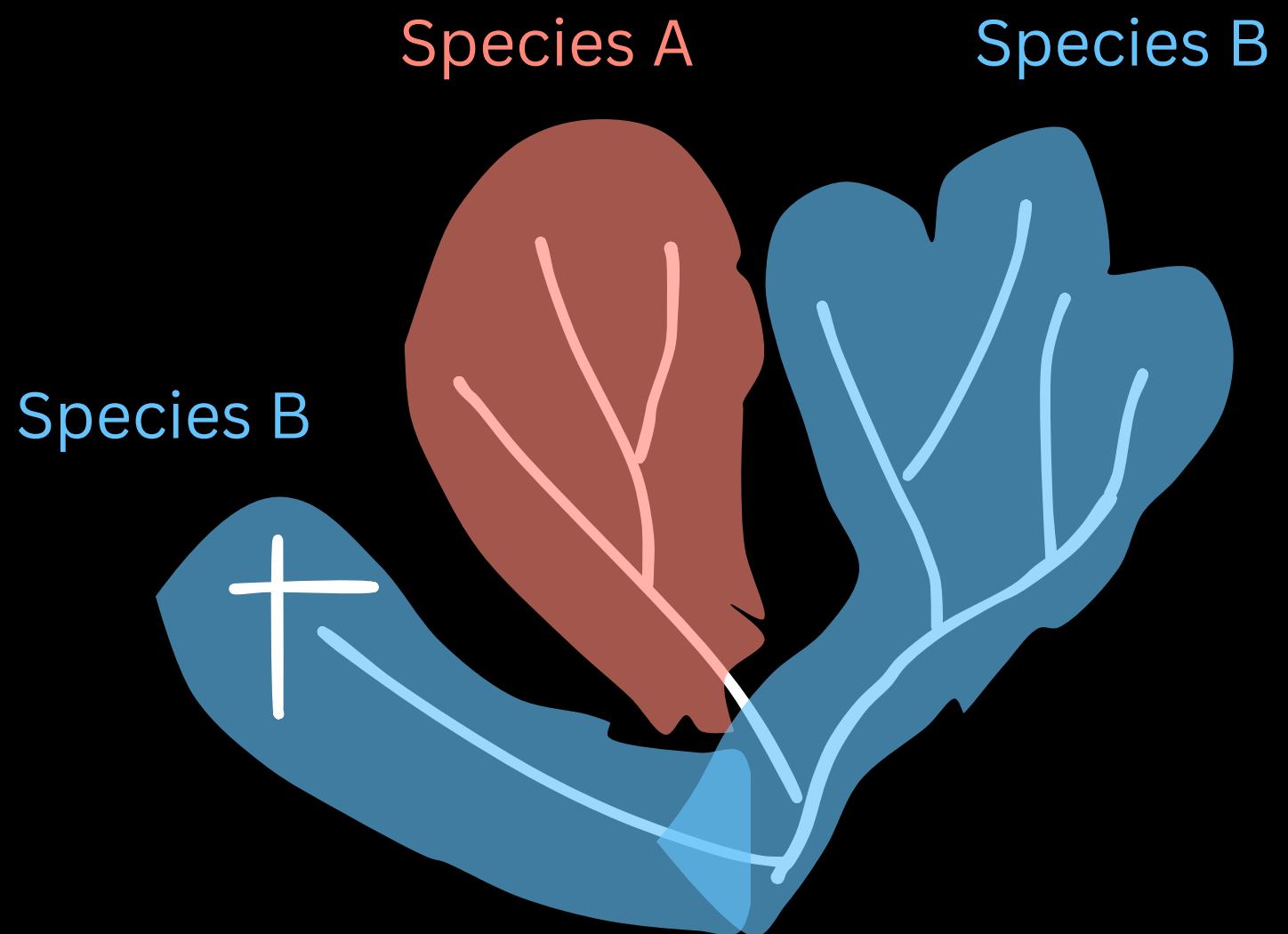
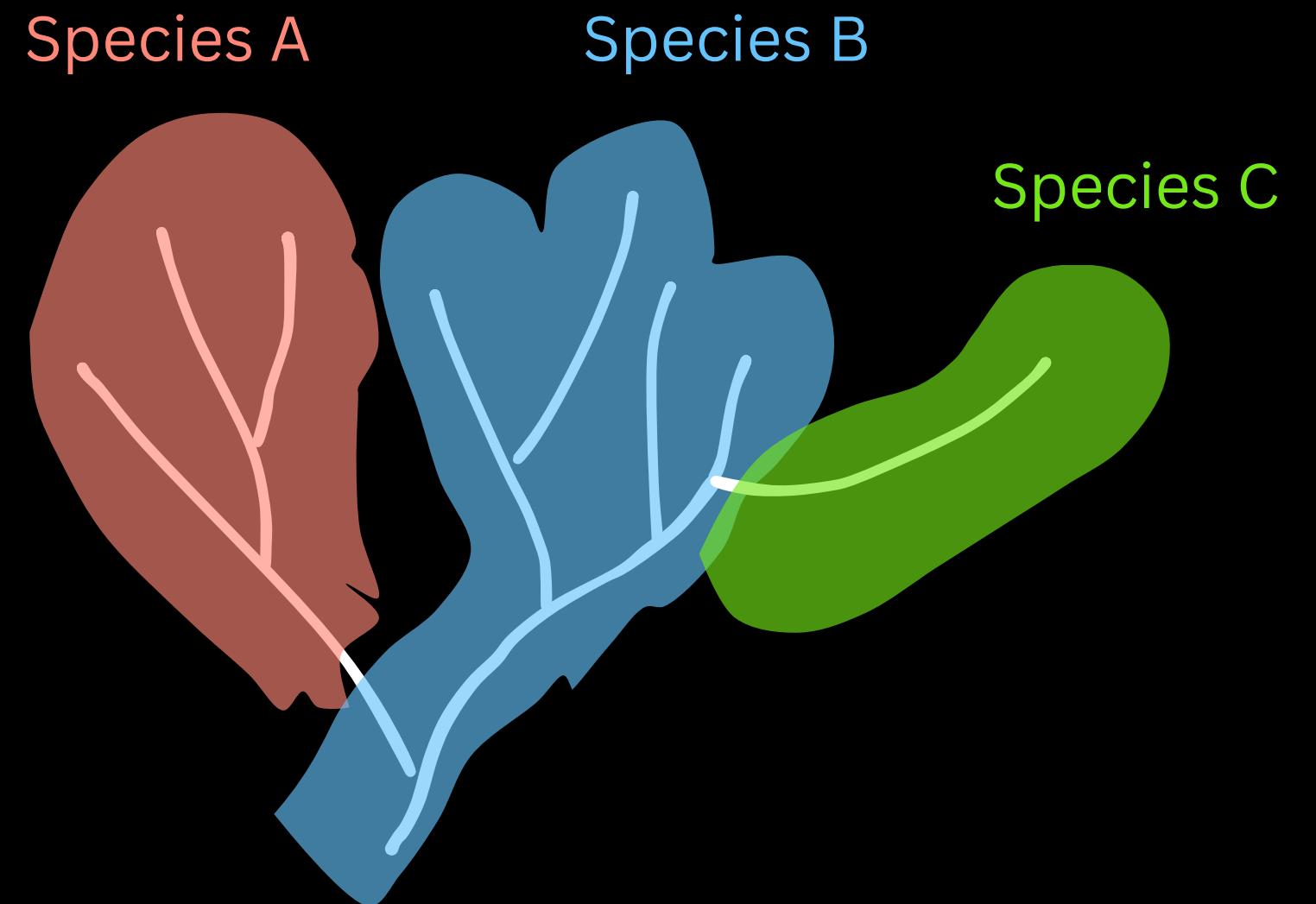


Chen et al. (2020)

hybrid speciation
(allopolyploid speciation)

Mallet (2007)

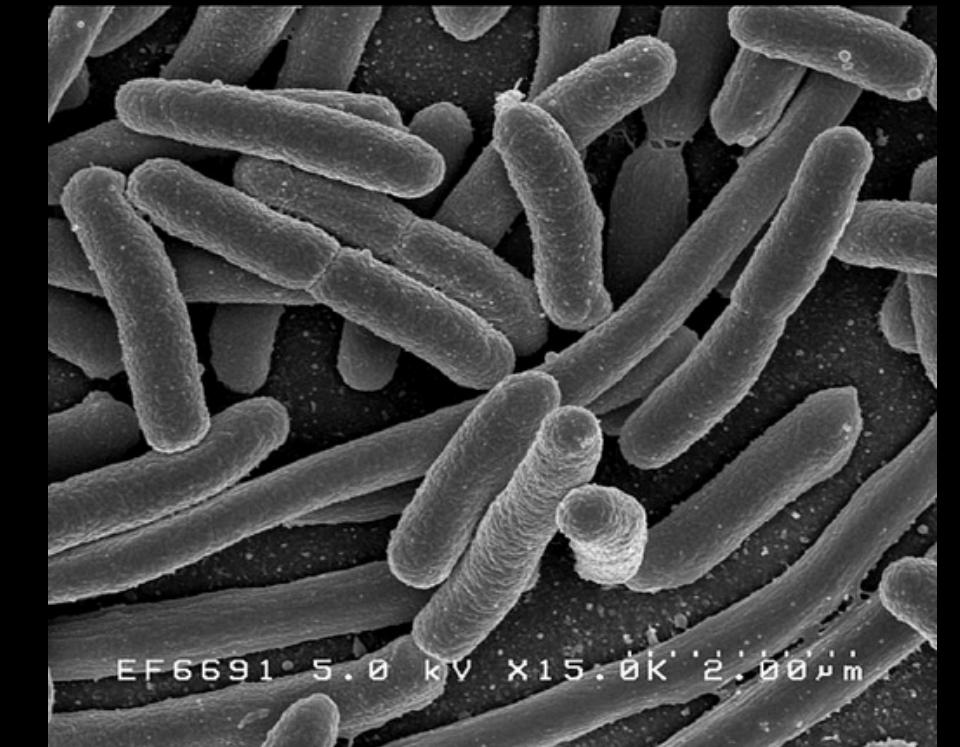
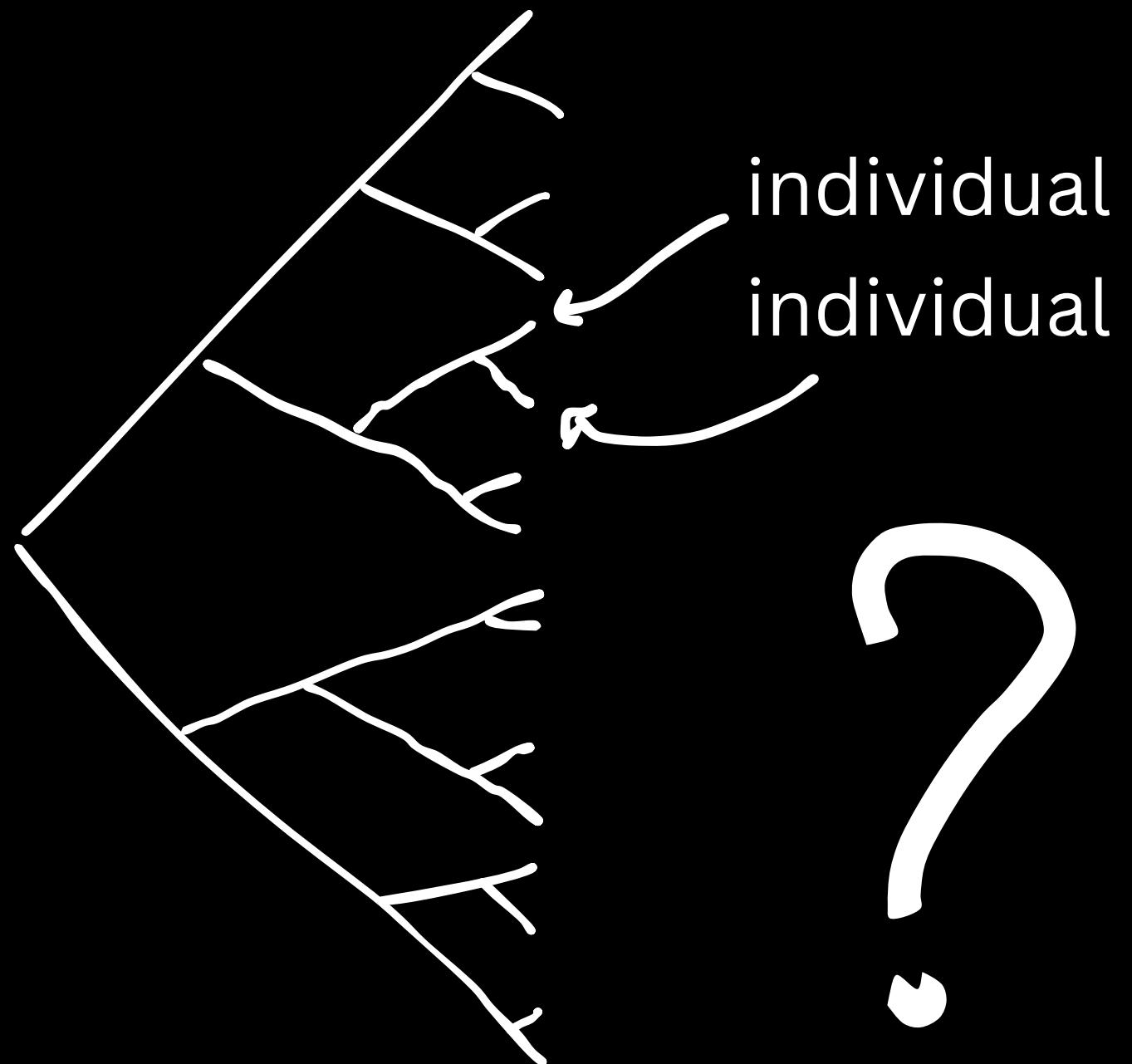
phylogenetic species concept



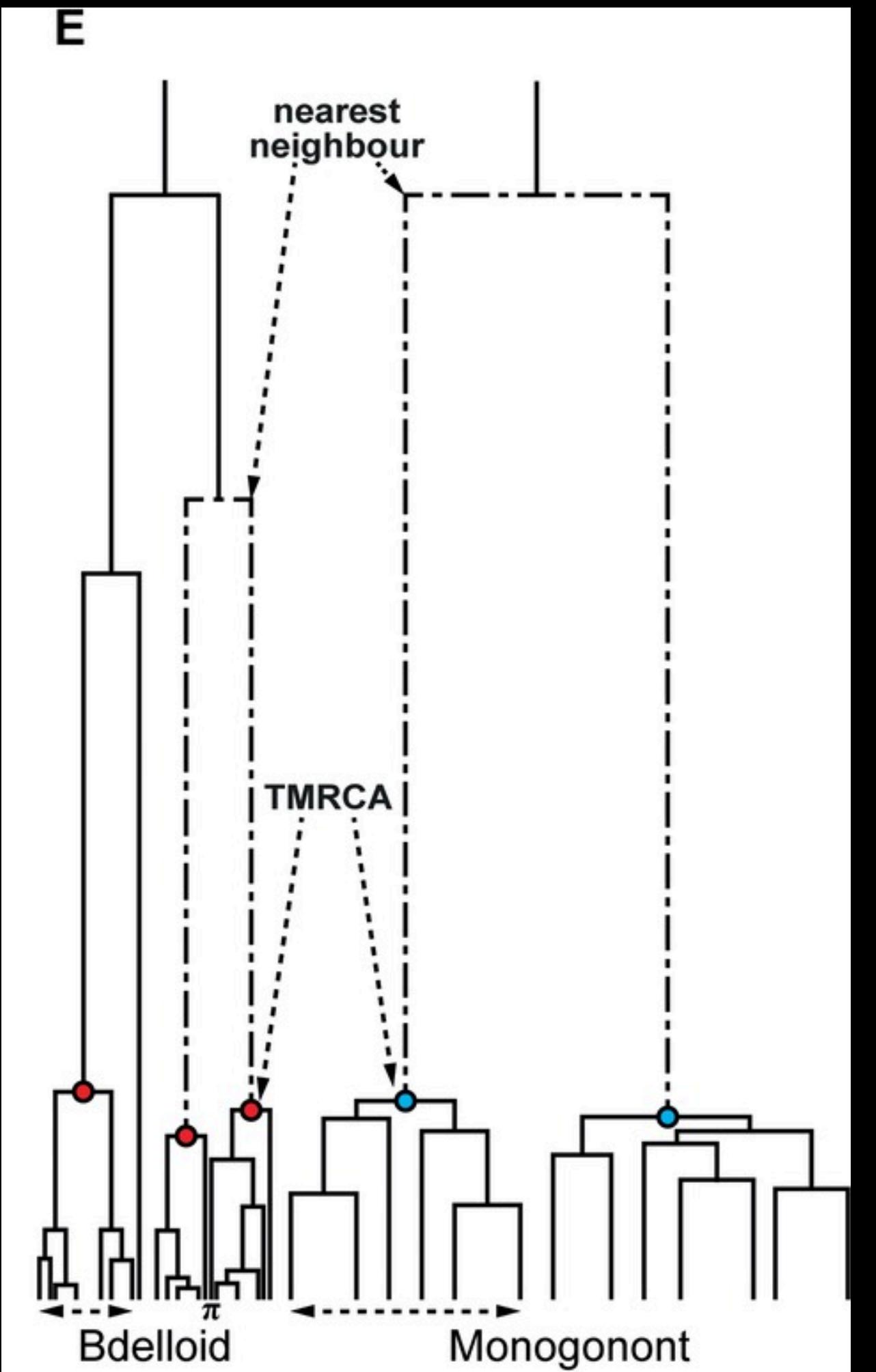
Coyne and Orr (2004)

aseexual species

Operational Taxonomic Units (OTU)



bacteria
horizontal gene transfer



Tang et al. (2014)



bdelloid rotifers

species discreteness

morphospecies

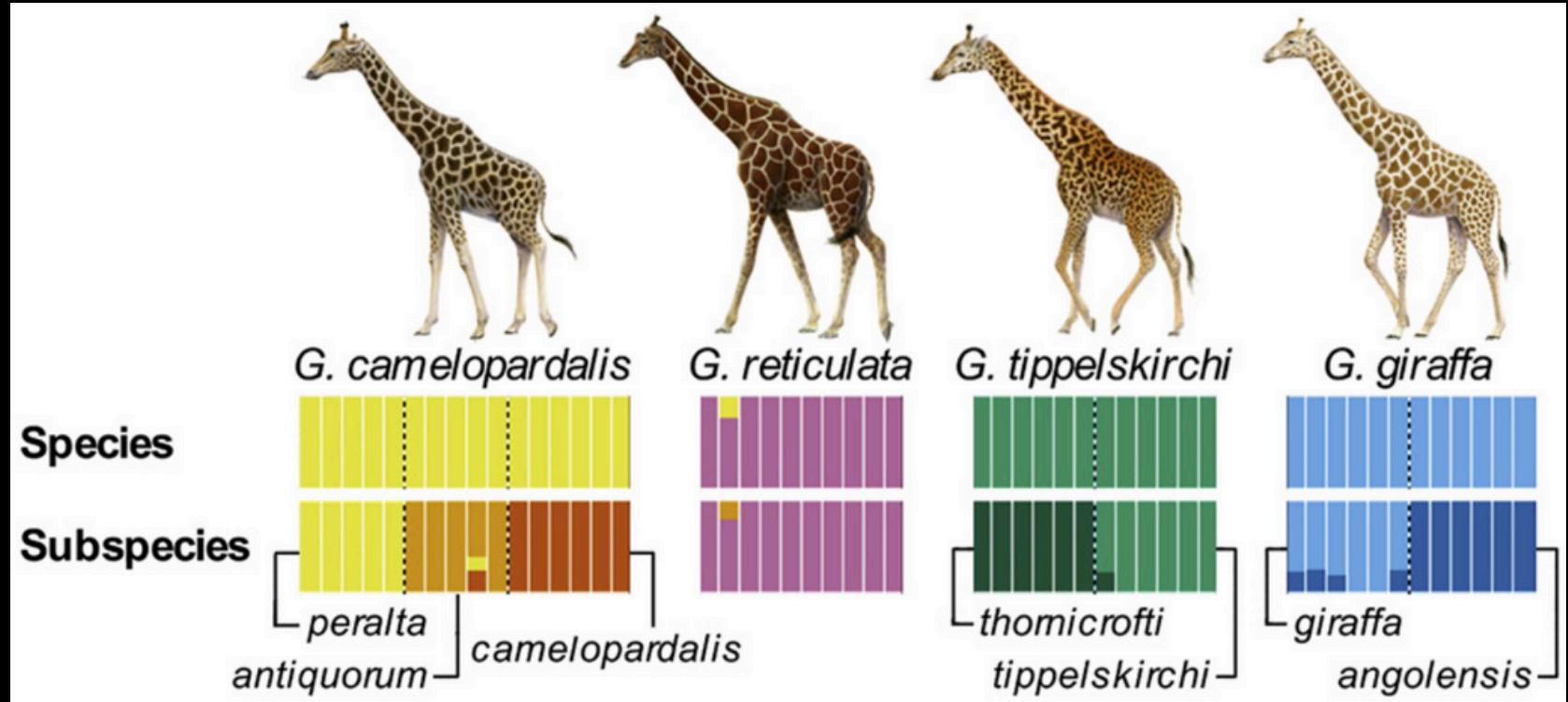


Barratt (2003)



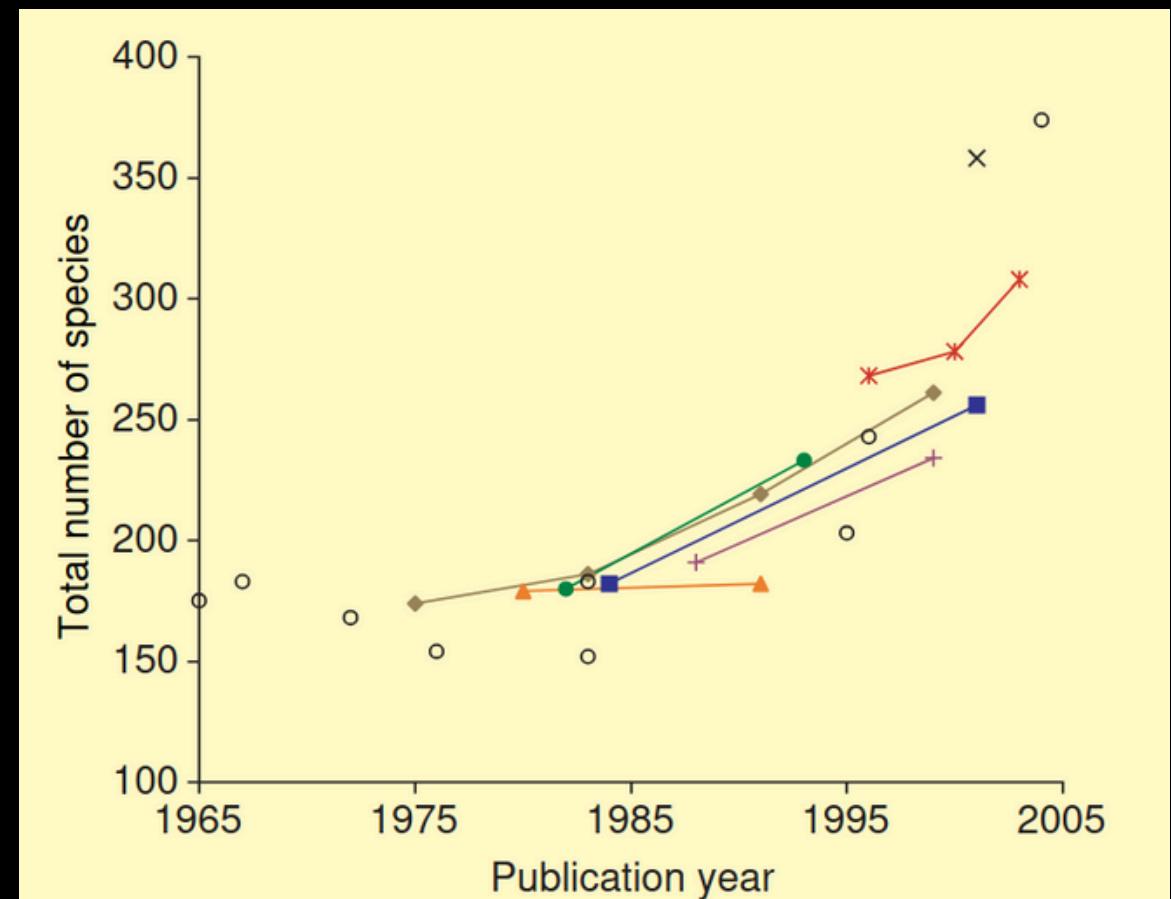
Mahon (2018)

cryptic species



Coimbra et al. (2021)

taxonomic inflation



Isaac et al. (2004)

World / Americas

Gigantic new snake species discovered in Amazon rainforest

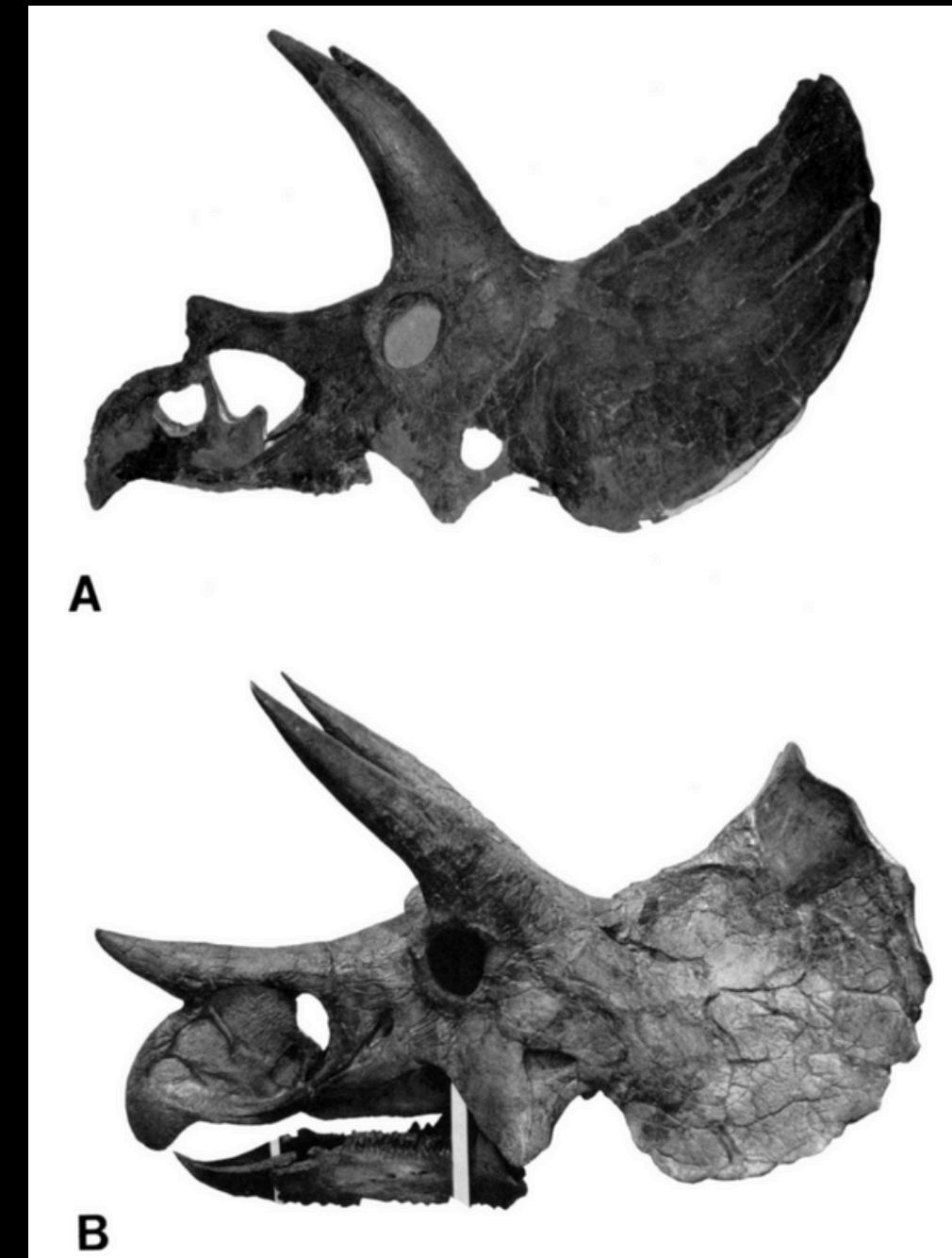
By Amy Woodyatt, CNN

⌚ 2 min read · Updated 10:20 AM EST, Fri February 23, 2024



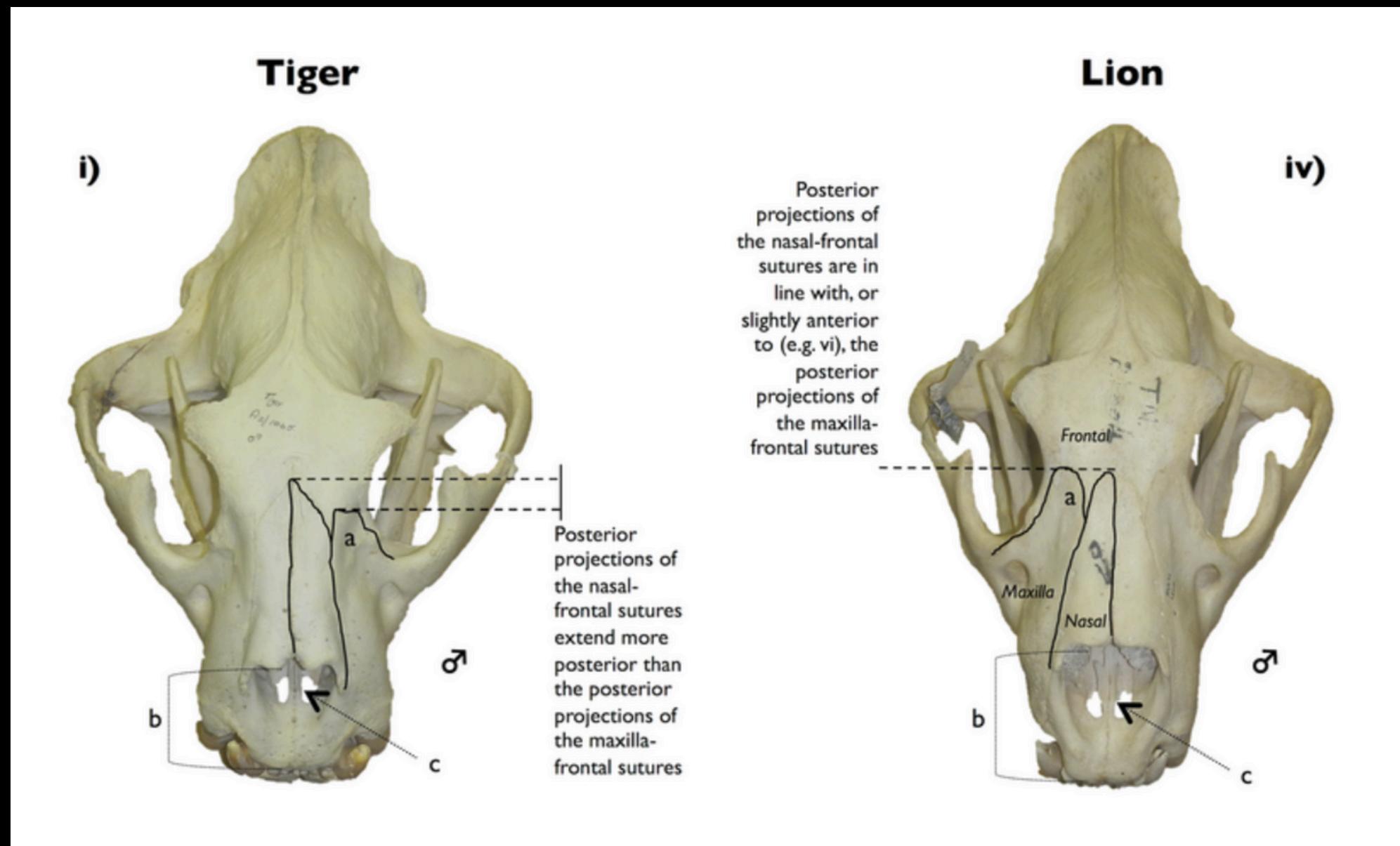
Rivas et al. (2024)

morphospecies



Forster (1996)

morphospecies



Williams et al. (2015)

Operational Taxonomic Units

**phylogenetic
species concept**

**biological
species concept**

**genotypic cluster
species concept**

**ecological
species concept**

morphospecies

**evolutionary
species concept**

Wiley (1978)

Van Valen (1976)

