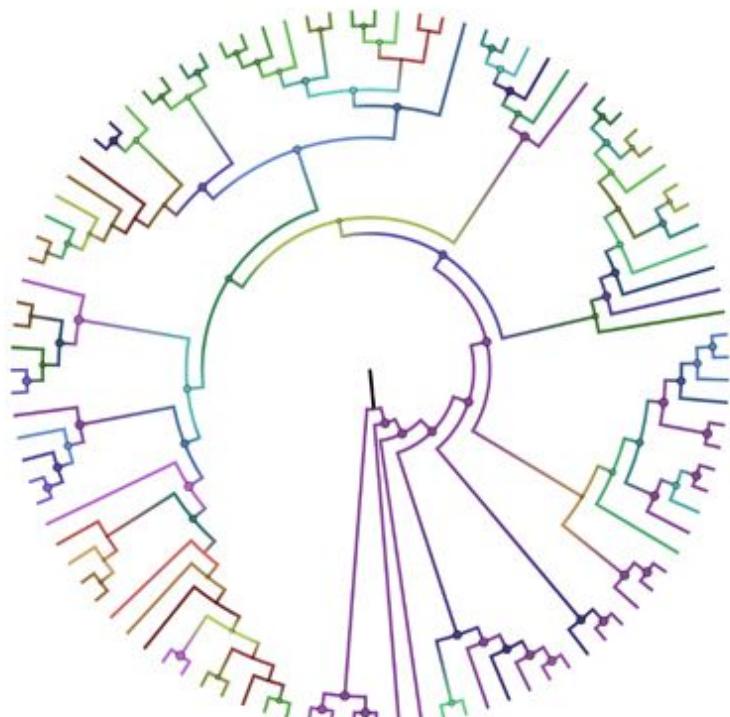


INFERENCIA FILOGENÉTICA



Julián Aguirre-Santoro
Instituto de Ciencias Naturales
Universidad Nacional de Colombia

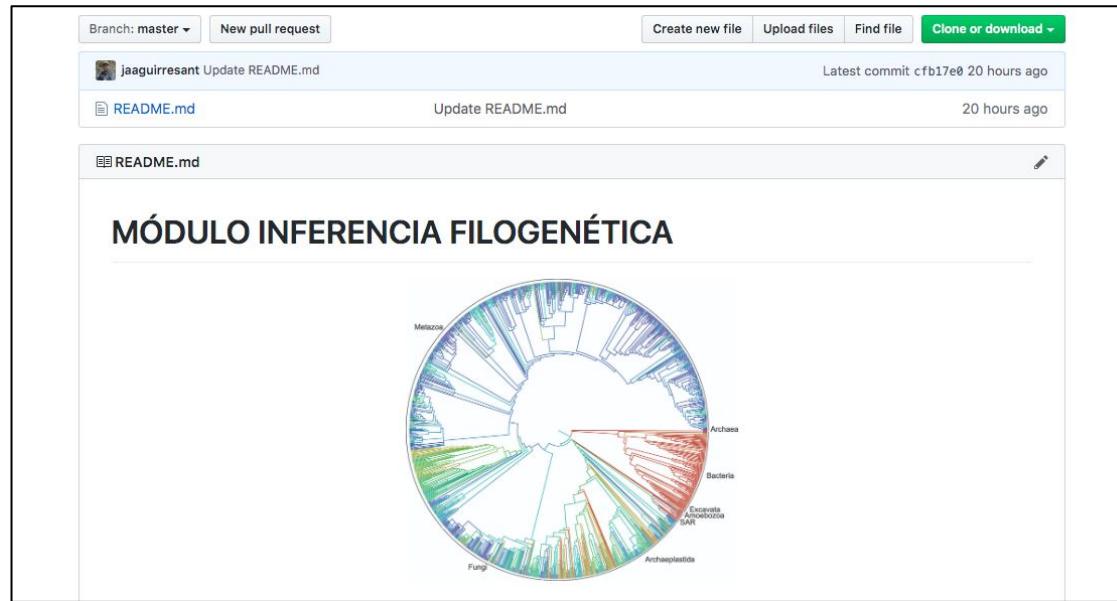


Oficina: 304, Instituto de Ciencias Naturales. Ext. 11541

Contacto: jaaguirresa@unal.edu.co

I. Ir a la página de GitHub para: talleres, presentaciones y artículos

<https://github.com/jaaguirresant/Sistematica-Biologica>



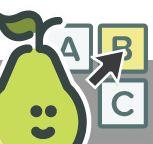
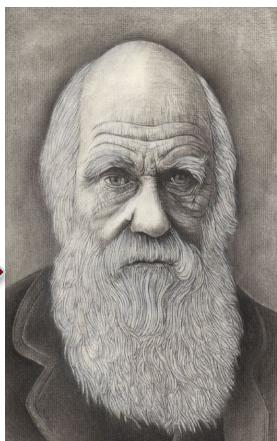
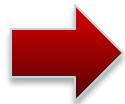
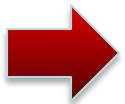
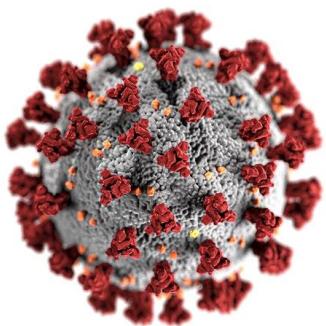
2. Subir tareas a Google Drive:

<https://drive.google.com/open?id=1GisuB1XngrFi8EogqVGG2JcI Oz--MLLN>

BREVE REPASO:

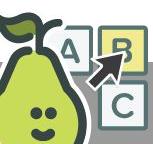
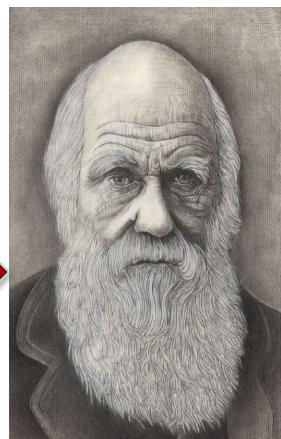
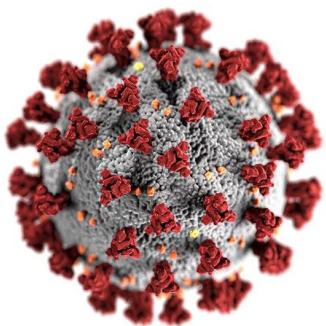
**LECTURA E INTERPRETACIÓN DE ÁRBOLES
FILOGENÉTICOS**

¿Cuál especie es más ancestral?



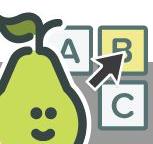
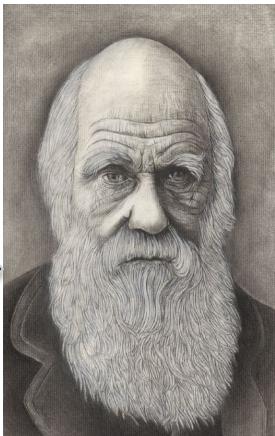
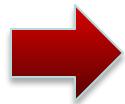
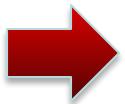
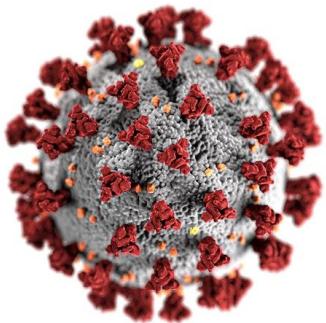
Students choose an option

¿Cuál especie es más evolucionada?



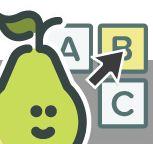
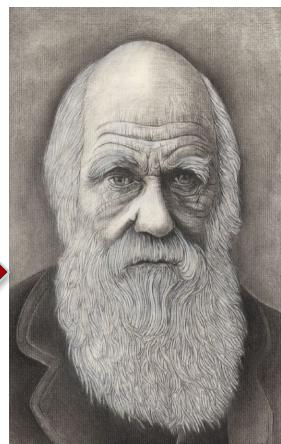
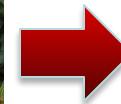
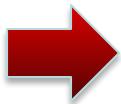
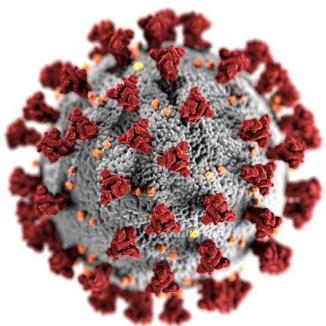
Students choose an option

¿Quién es más primitivo, el coronavirus o la piña?



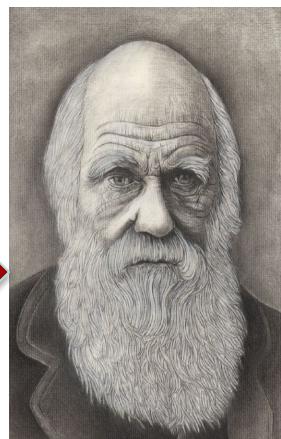
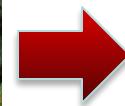
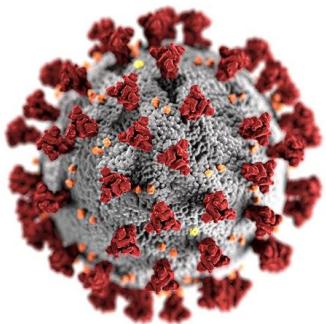
Students choose an option

Entre la piña y el humano ¿Cuál especie es inferior y cuál superior?



Students choose an option

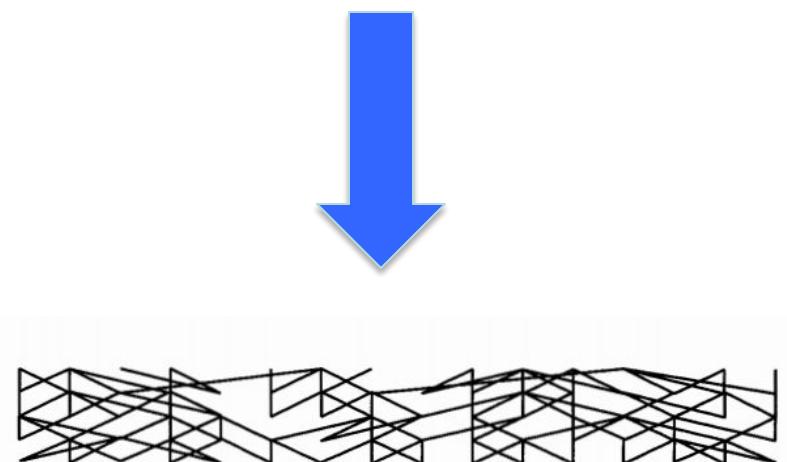
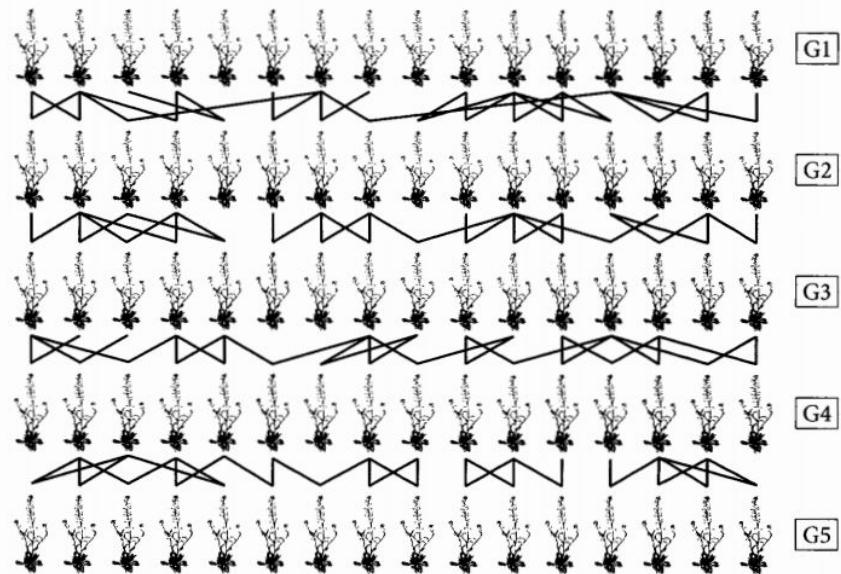
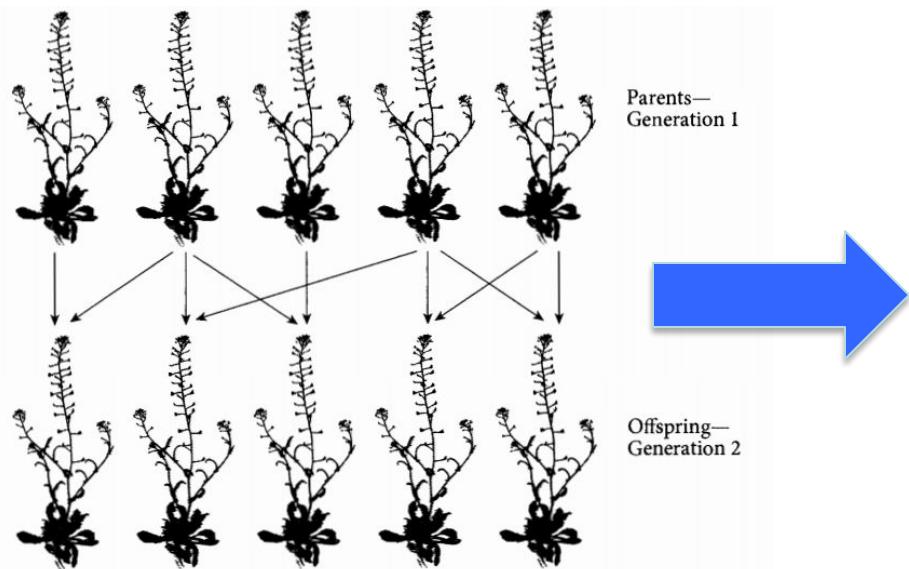
¿De cuál especie se originó el humano?



Students, write your response!

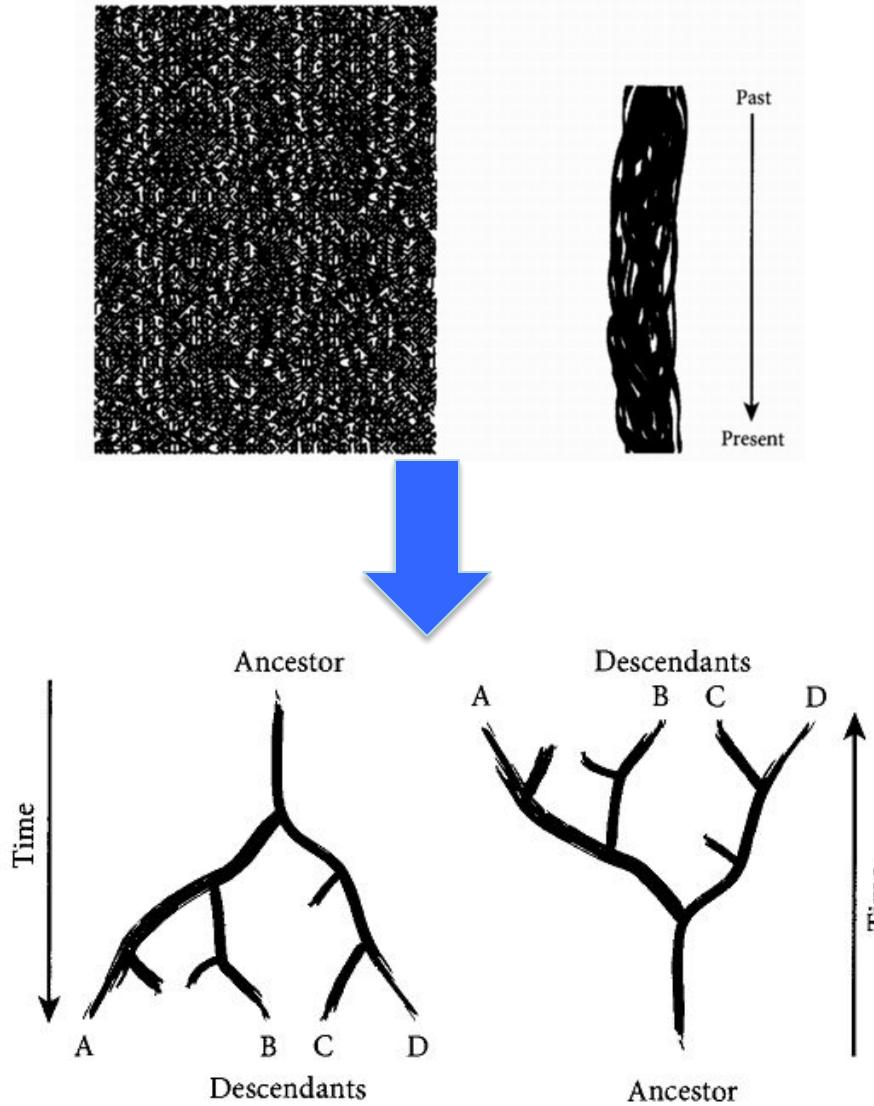
¿Que representa un árbol filogenético?

ANCESTRALIDAD DE UN CONJUNTO DE TERMINALES



¿Qué representa un árbol filogenético?

ANCESTRALIDAD DE UN CONJUNTO DE TERMINALES



ÁRBOLES: Terminología y convenciones

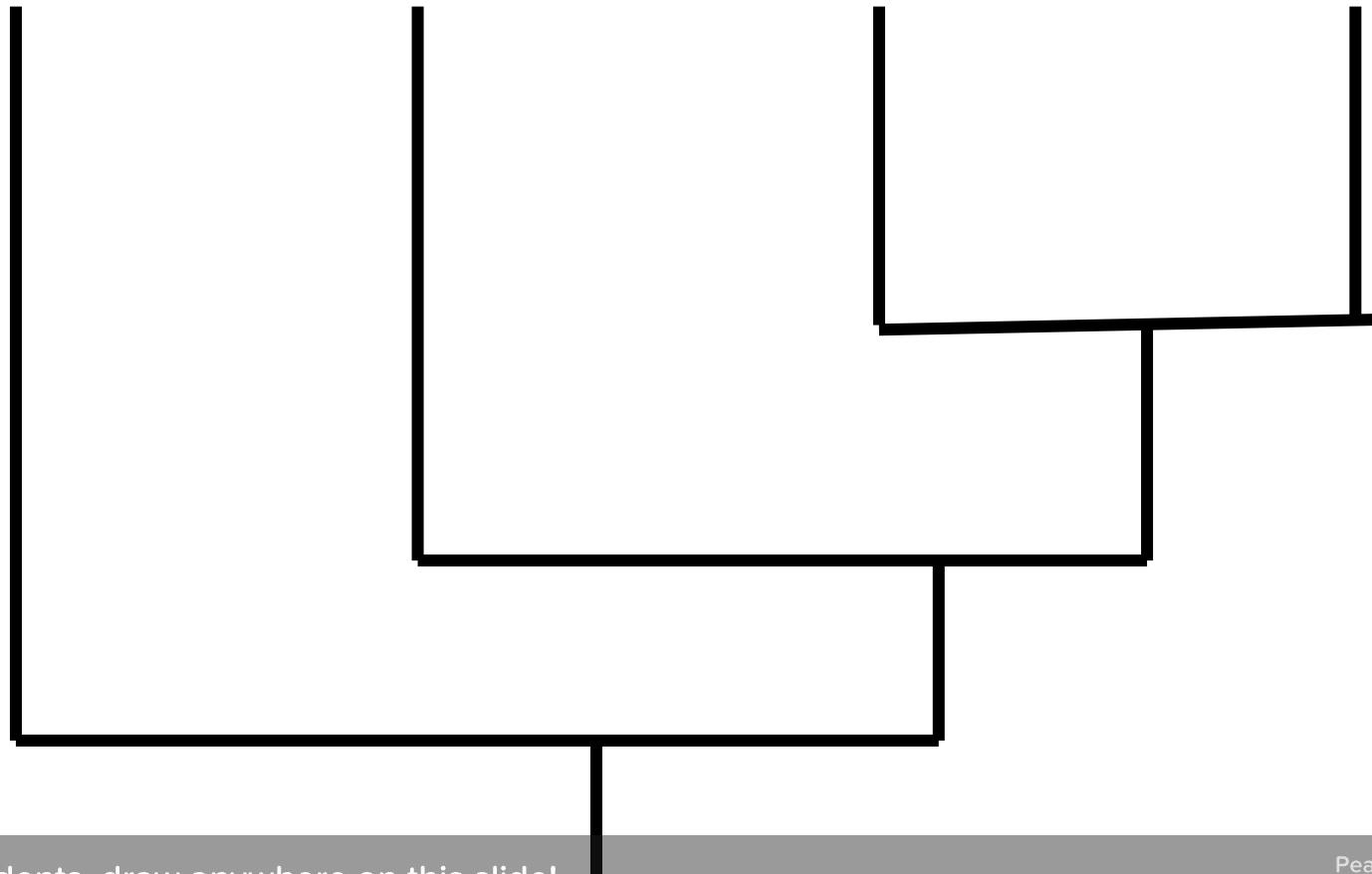
Señale un “terminal” en el árbol

Coronavirus

Piña

Amanita

Humano



Students, draw anywhere on this slide!

ÁRBOLES: Terminología y convenciones

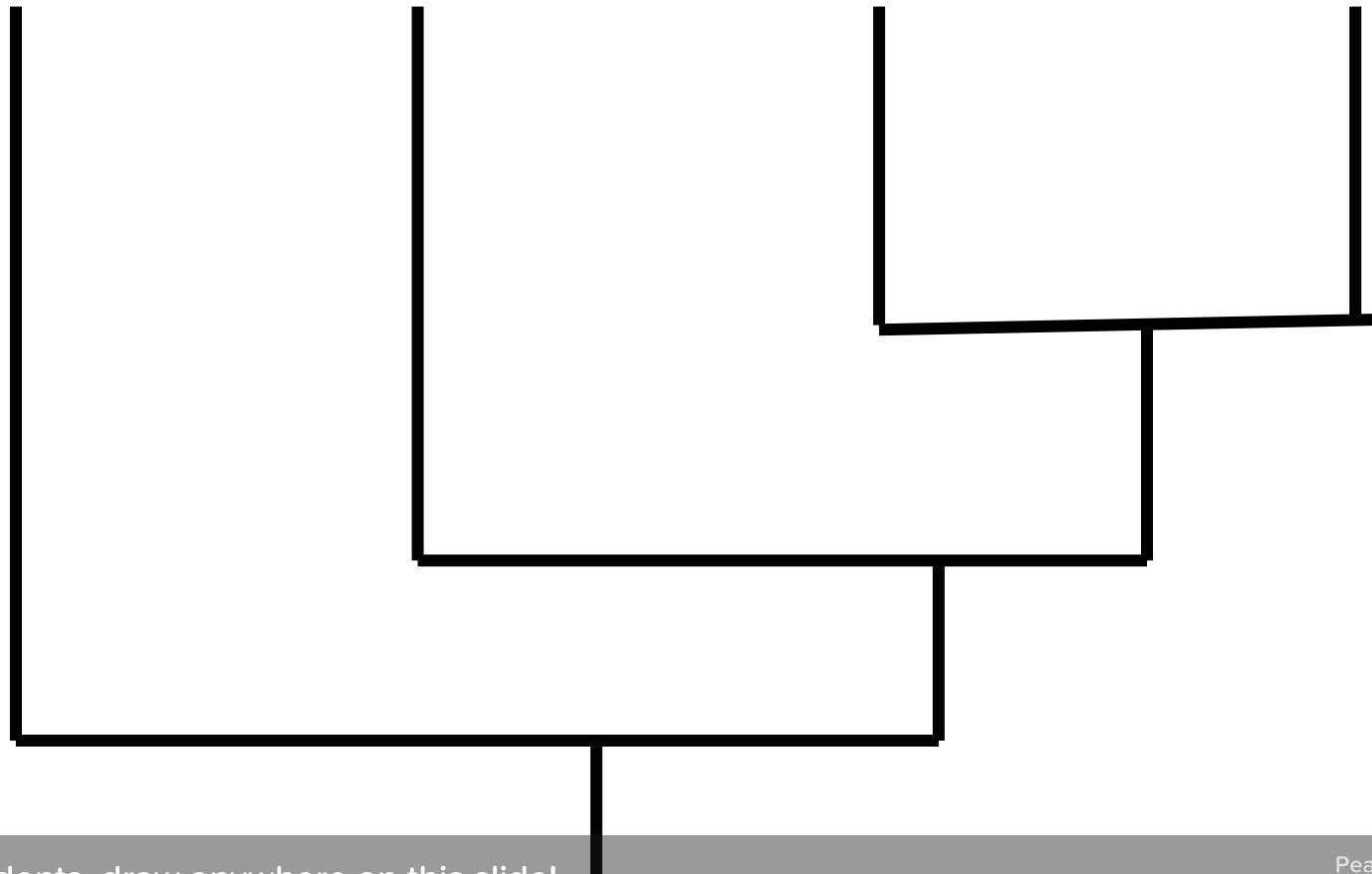
Señale un “nodo” en el árbol

Coronavirus

Piña

Amanita

Humano



Students, draw anywhere on this slide!

ÁRBOLES: Terminología y convenciones

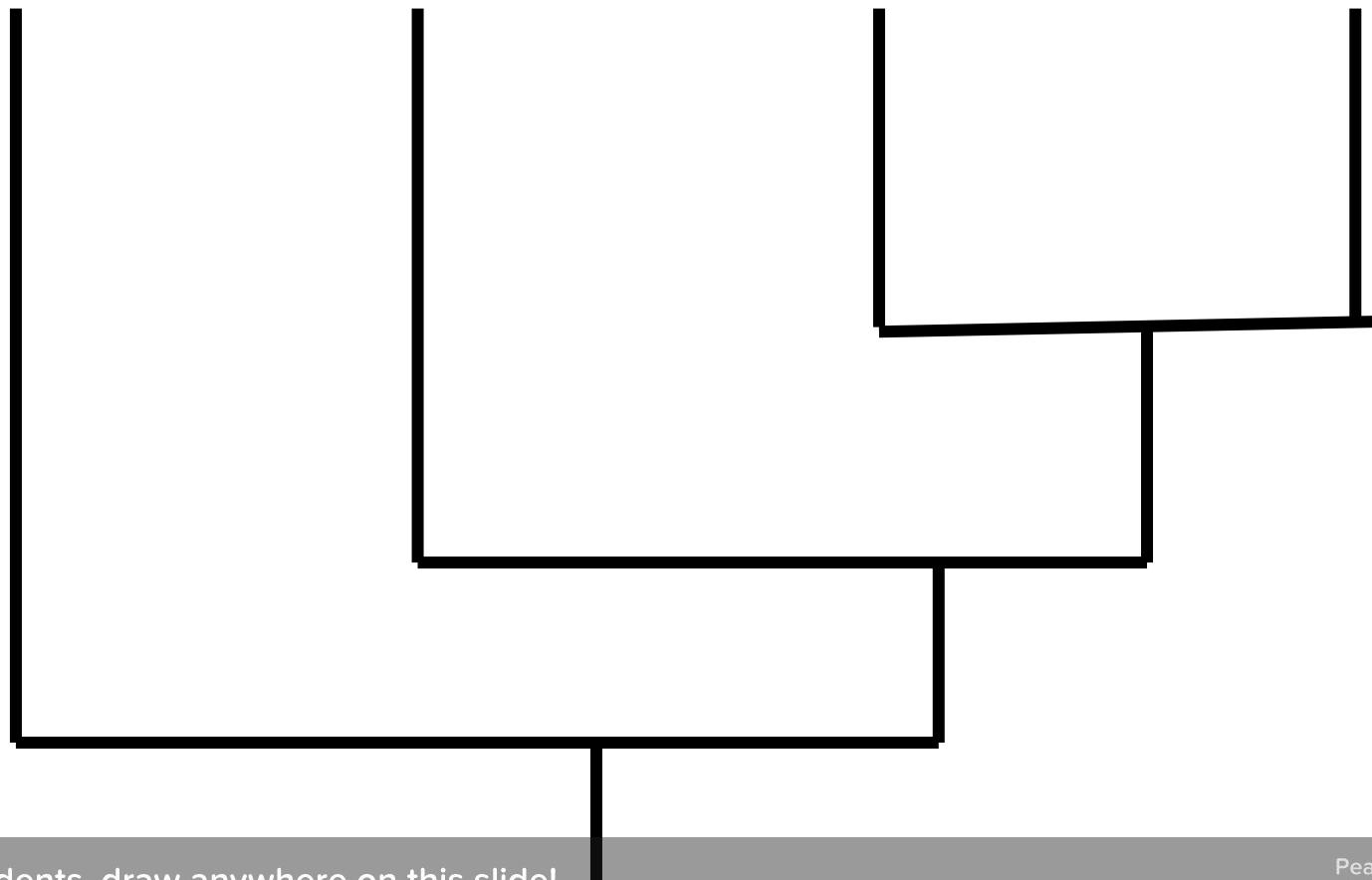
Señale una “rama interna” en el árbol

Coronavirus

Piña

Amanita

Humano



Students, draw anywhere on this slide!

ÁRBOLES: Terminología y convenciones

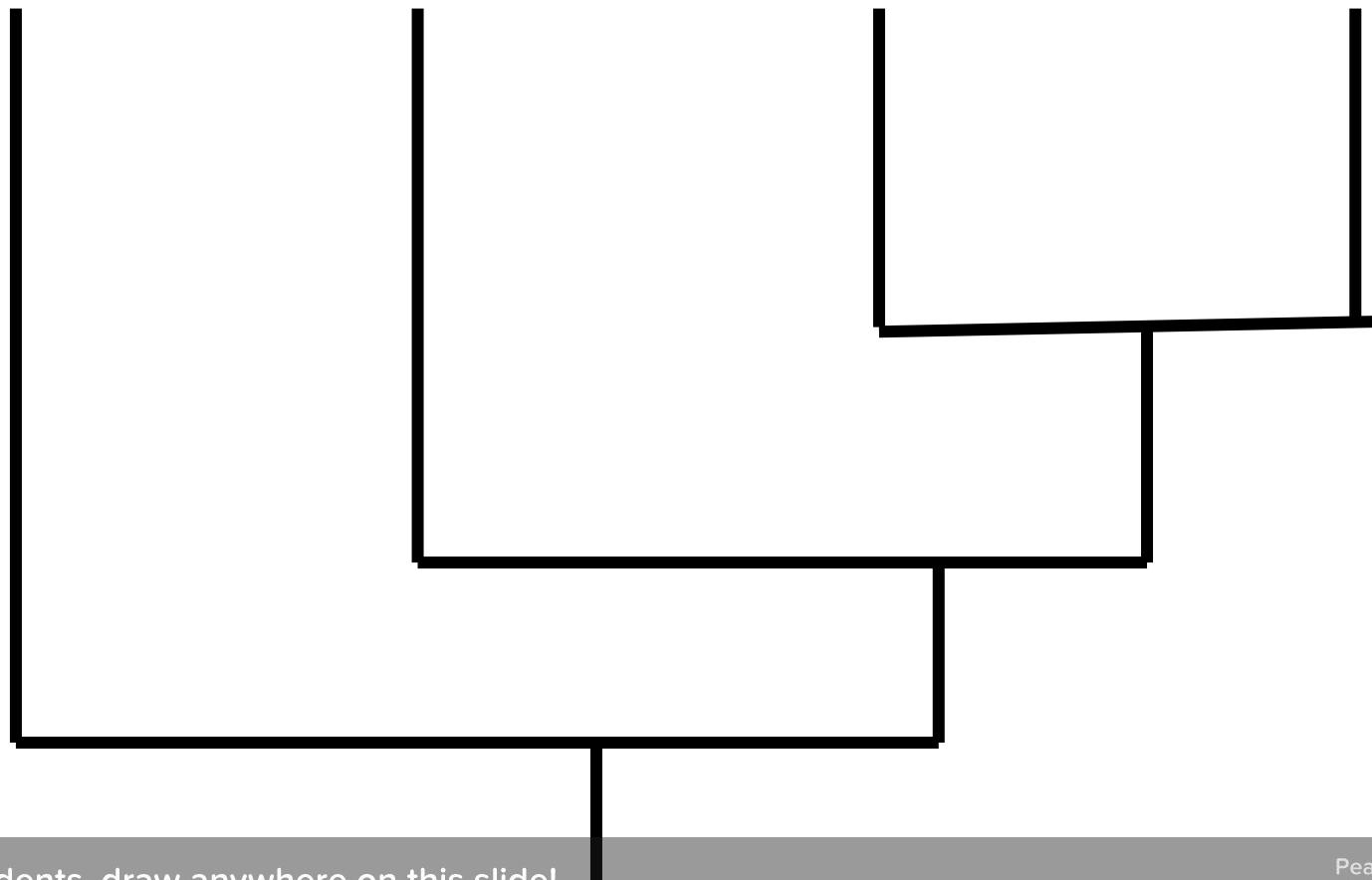
Señale la “raíz” del árbol

Coronavirus

Piña

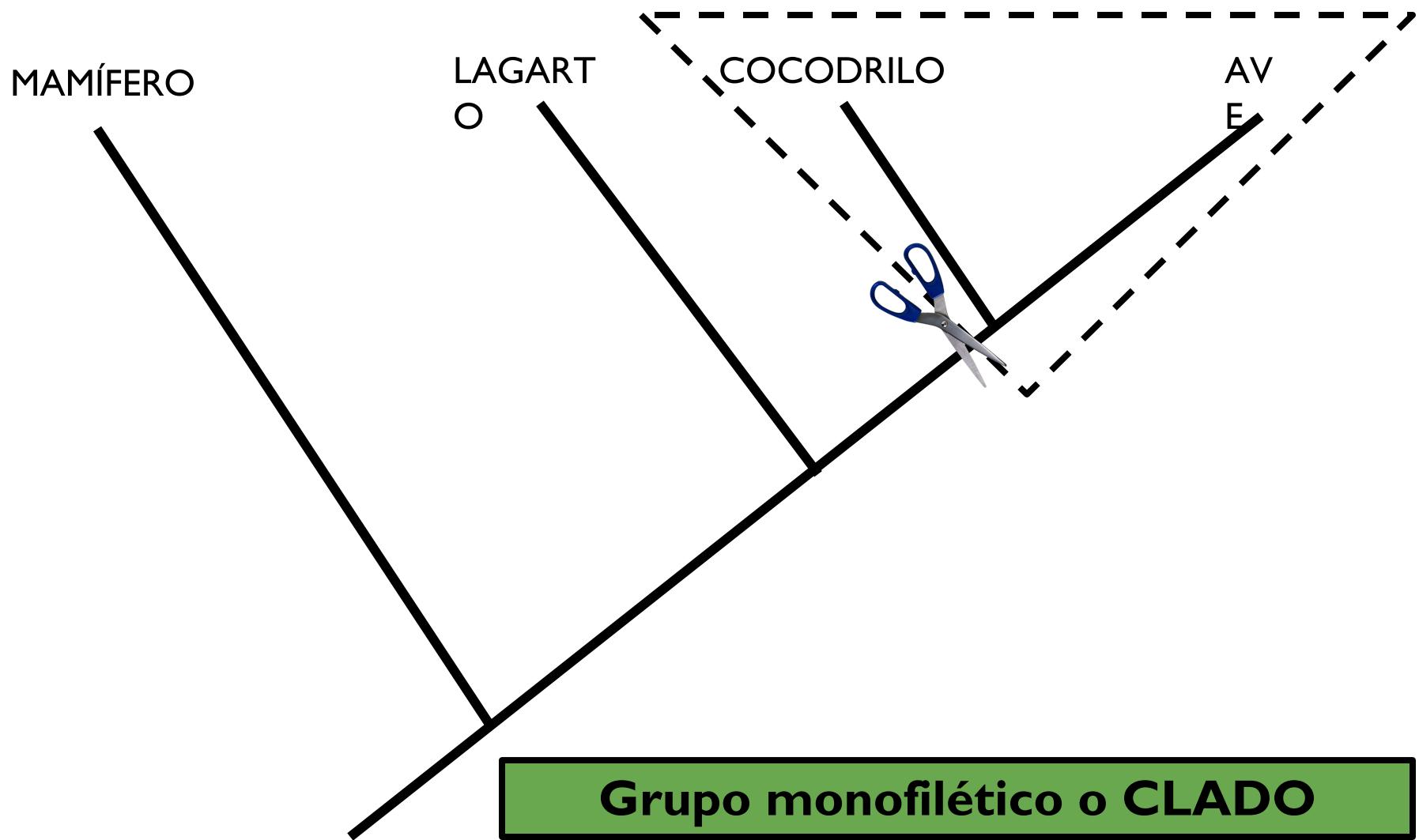
Amanita

Humano

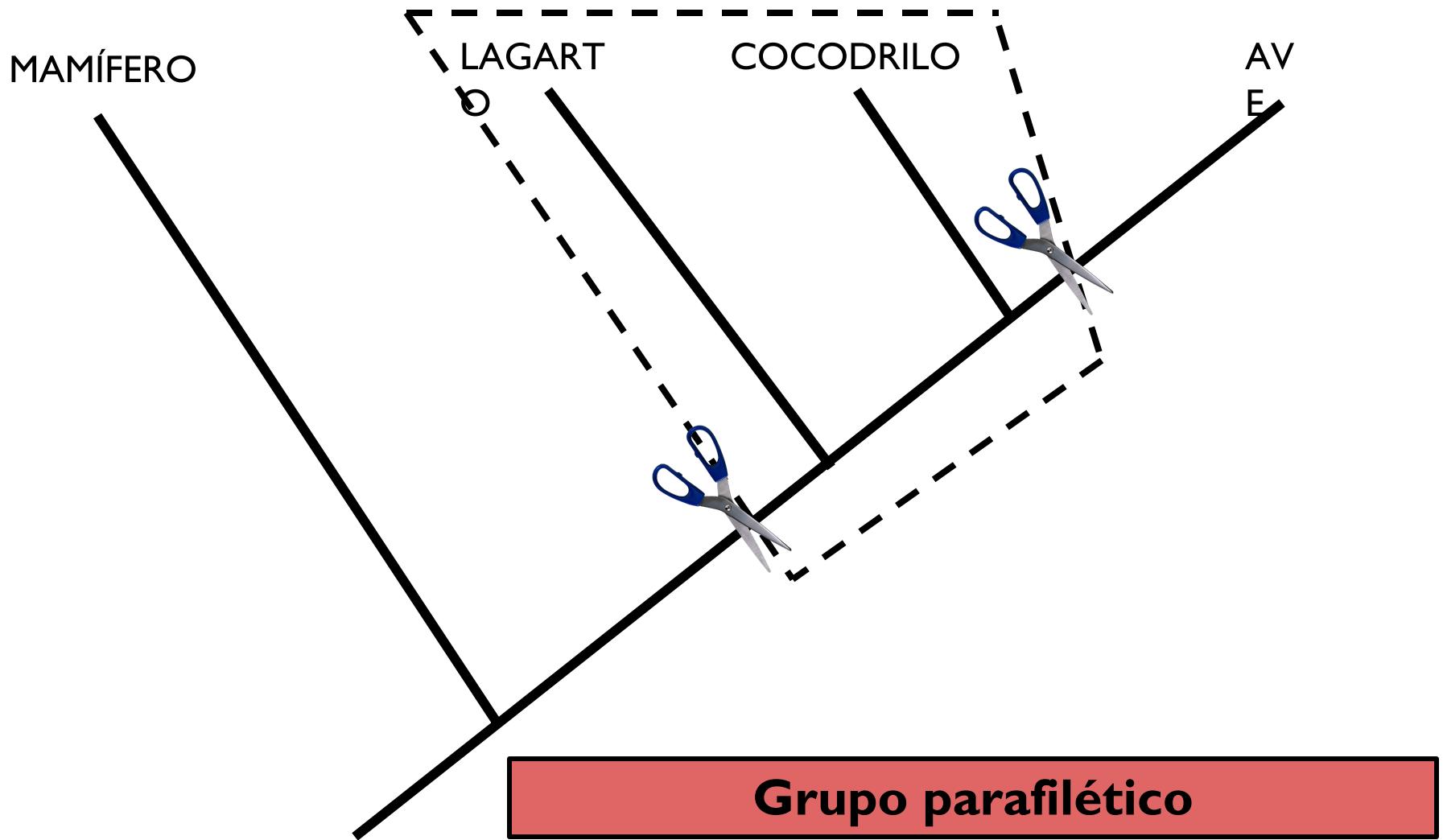


Students, draw anywhere on this slide!

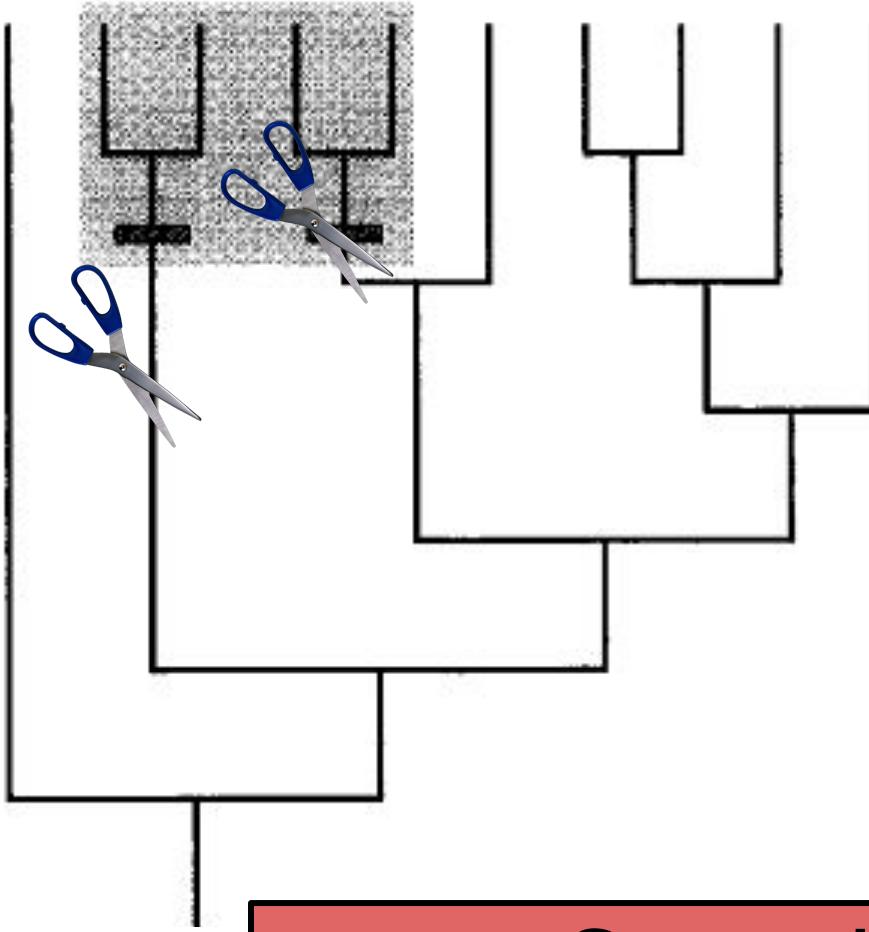
ÁRBOLES: Terminología y convenciones



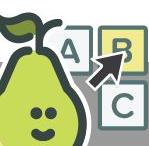
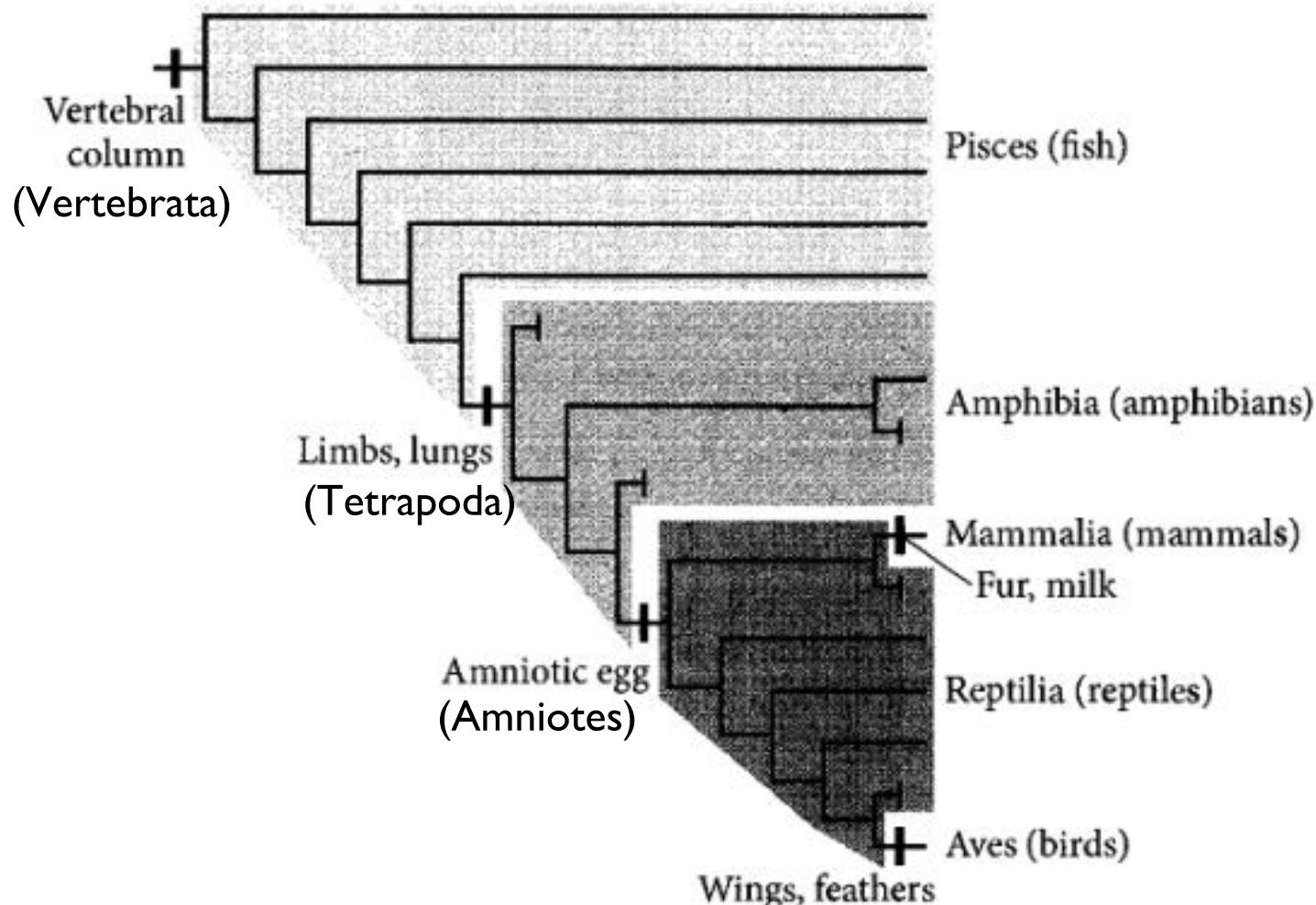
ÁRBOLES: Terminología y convenciones



ÁRBOLES: Terminología y convenciones

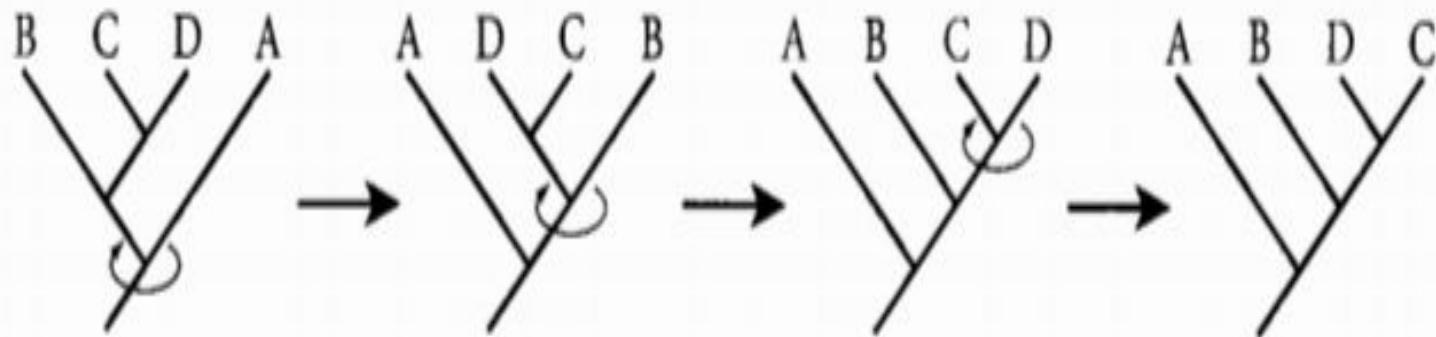


Con base en el árbol de los vertebrados: ¿Cuál de los siguientes grupos son monofiléticos?

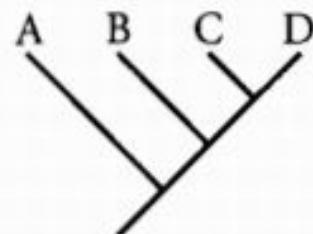


Students choose an option

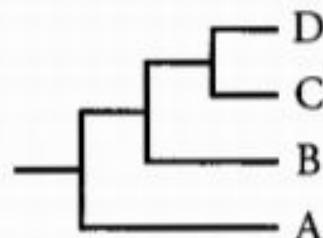
ÁRBOLES: Topología



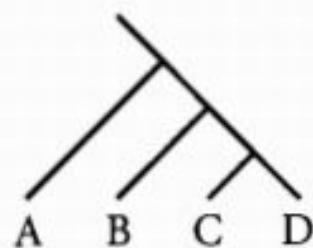
ÁRBOLES: Topología



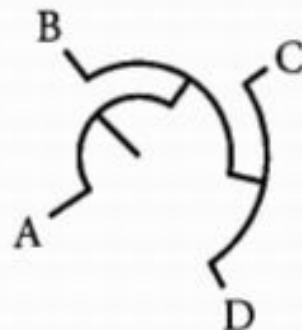
Diagonal-up



Rectangular-right

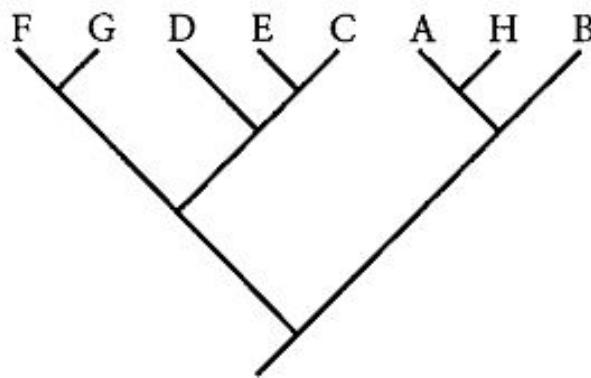


Diagonal-down

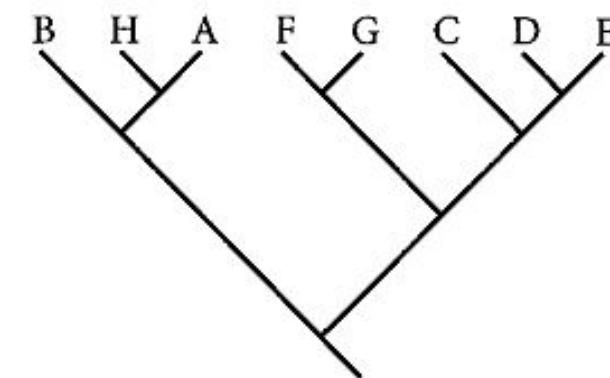


Circle

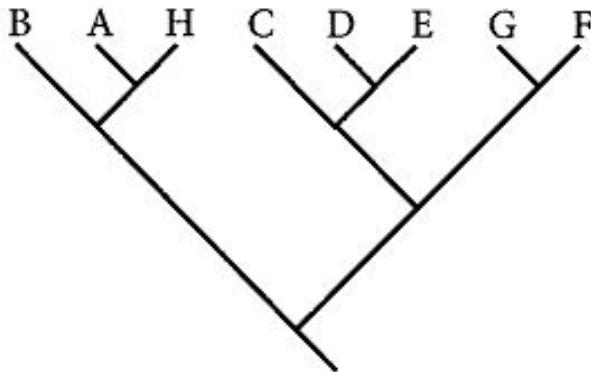
¿Cuál de los siguientes árboles muestra un patrón de de ramificación distinto?



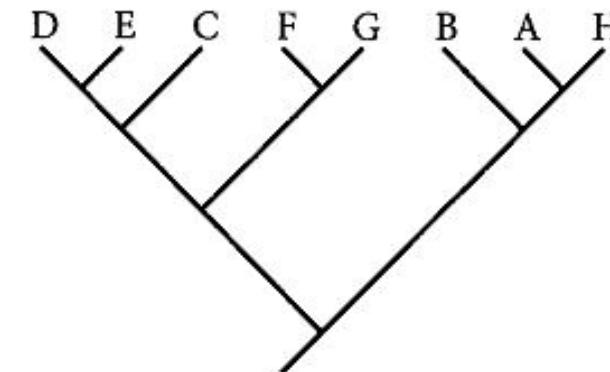
a



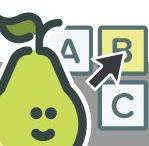
b



c

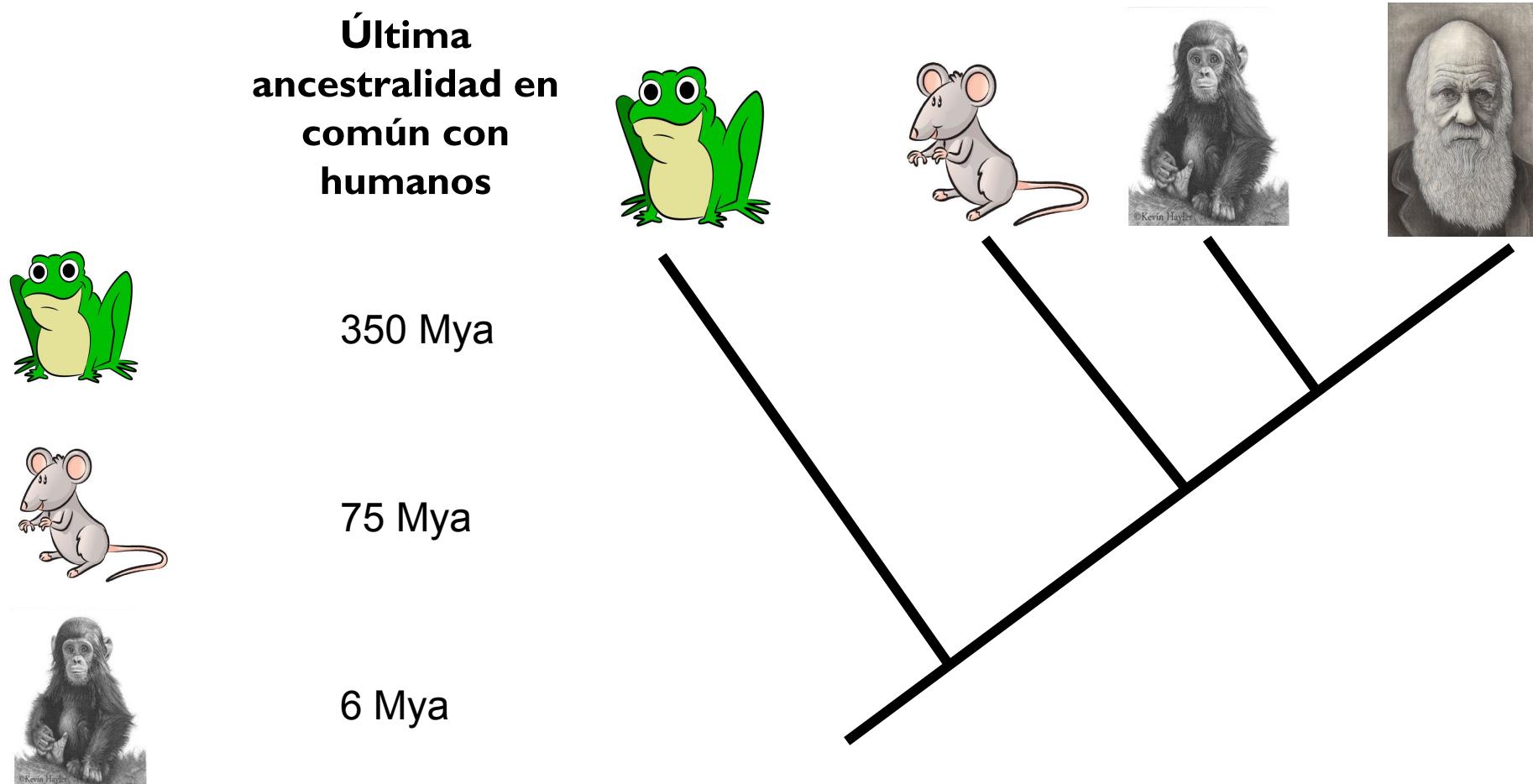


d



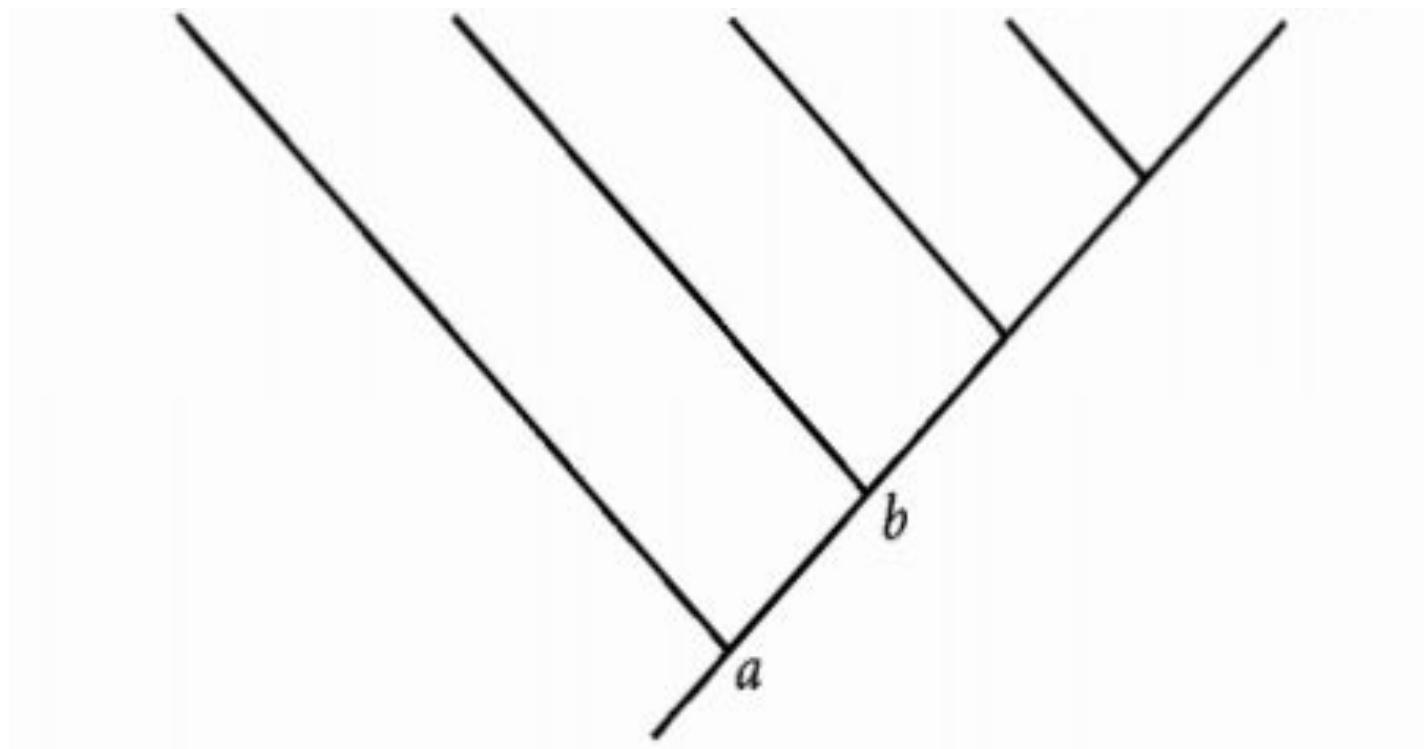
Students choose an option

¿Qué significa estar relacionado en el contexto de un árbol filogenético?

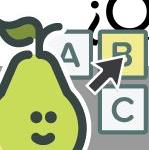


¿Que significa estar relacionado en el contexto de un árbol filogenético?

Pulmonado Salamandra Cocodrilo Ratón Humano

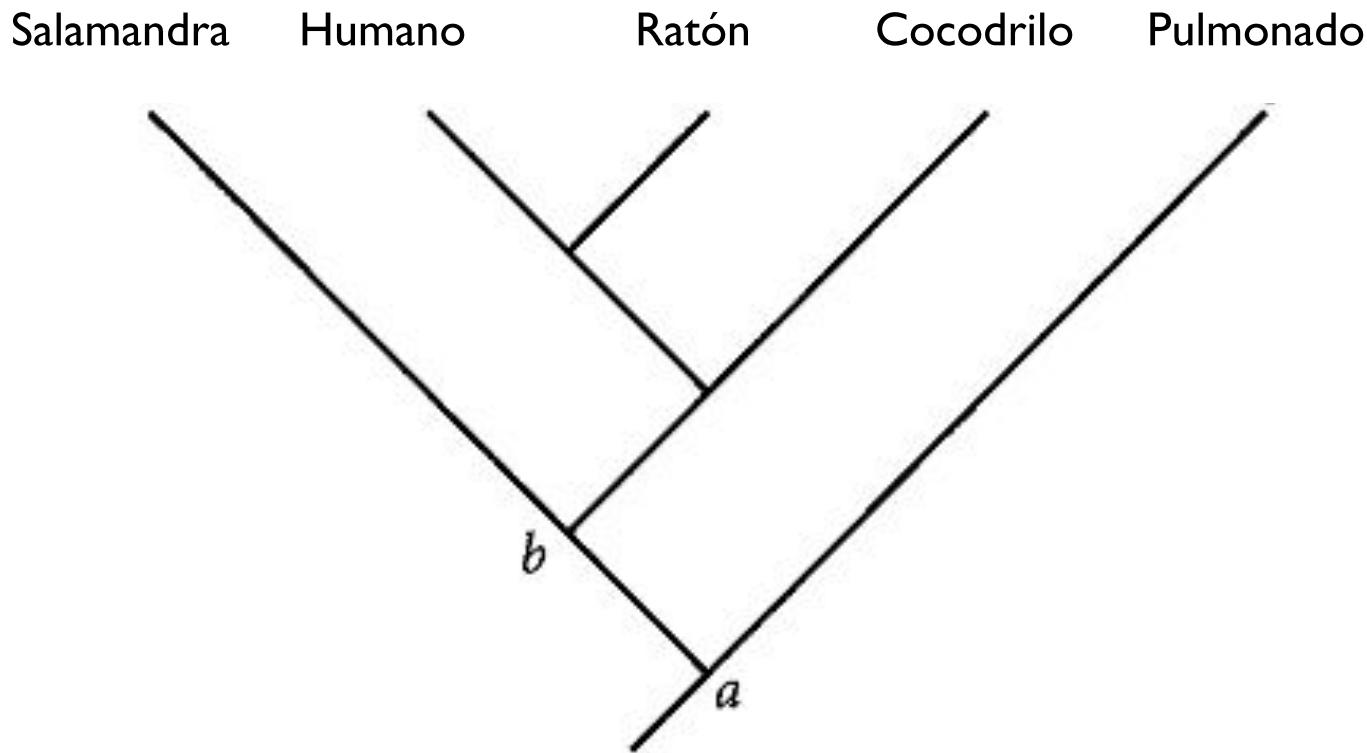


¿Quien está más relacionado a la salamandra: humano o pulmonado?



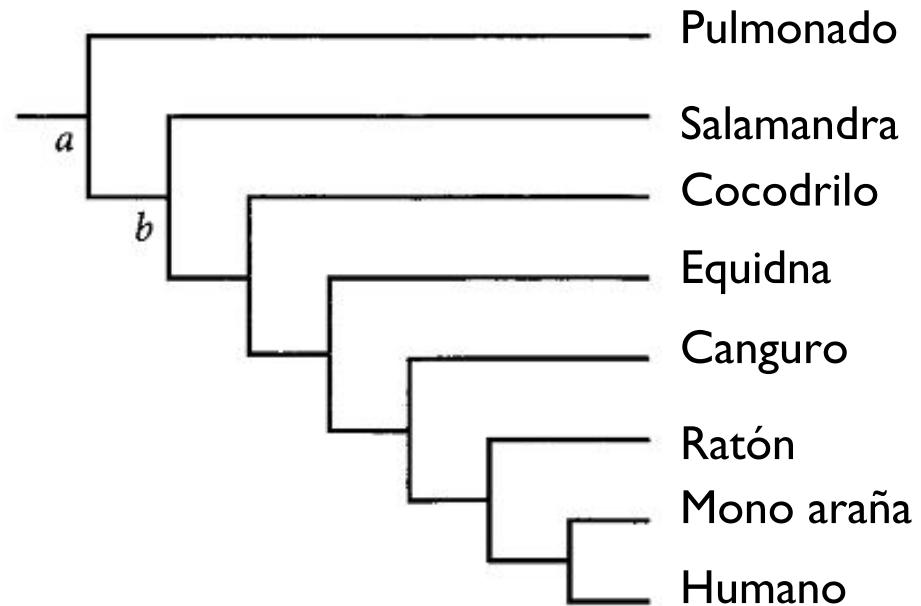
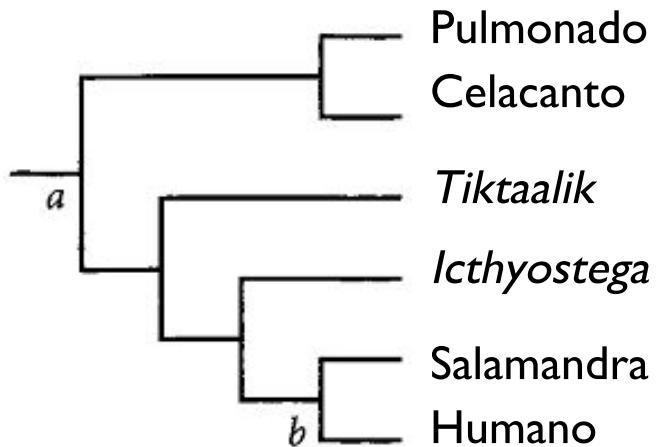
Students choose an option

¿Qué significa estar relacionado en el contexto de un árbol filogenético?



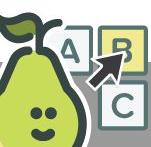
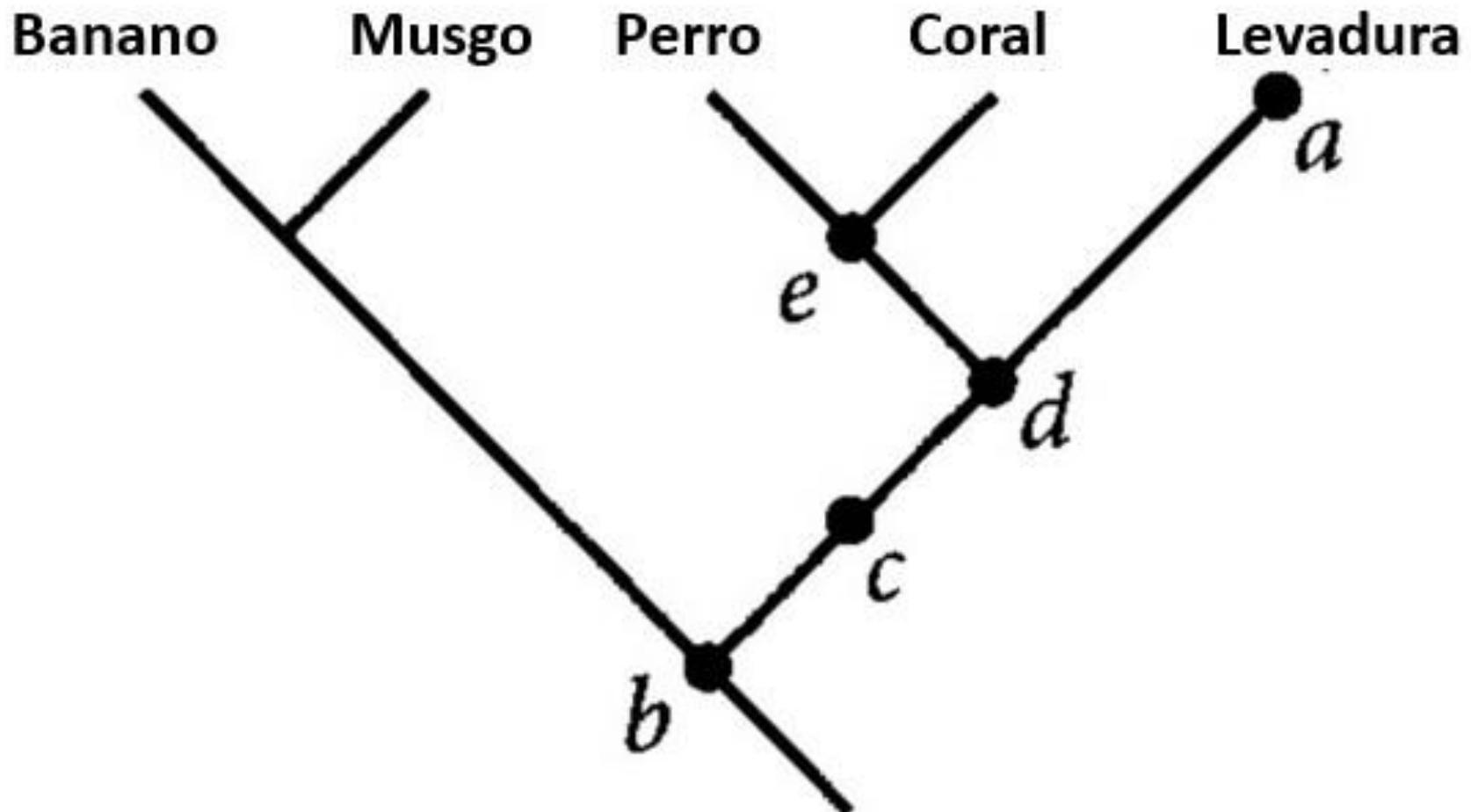
Error I: juzgar con base en el orden de los terminales

¿Qué significa estar relacionado en el contexto de un árbol filogenético?



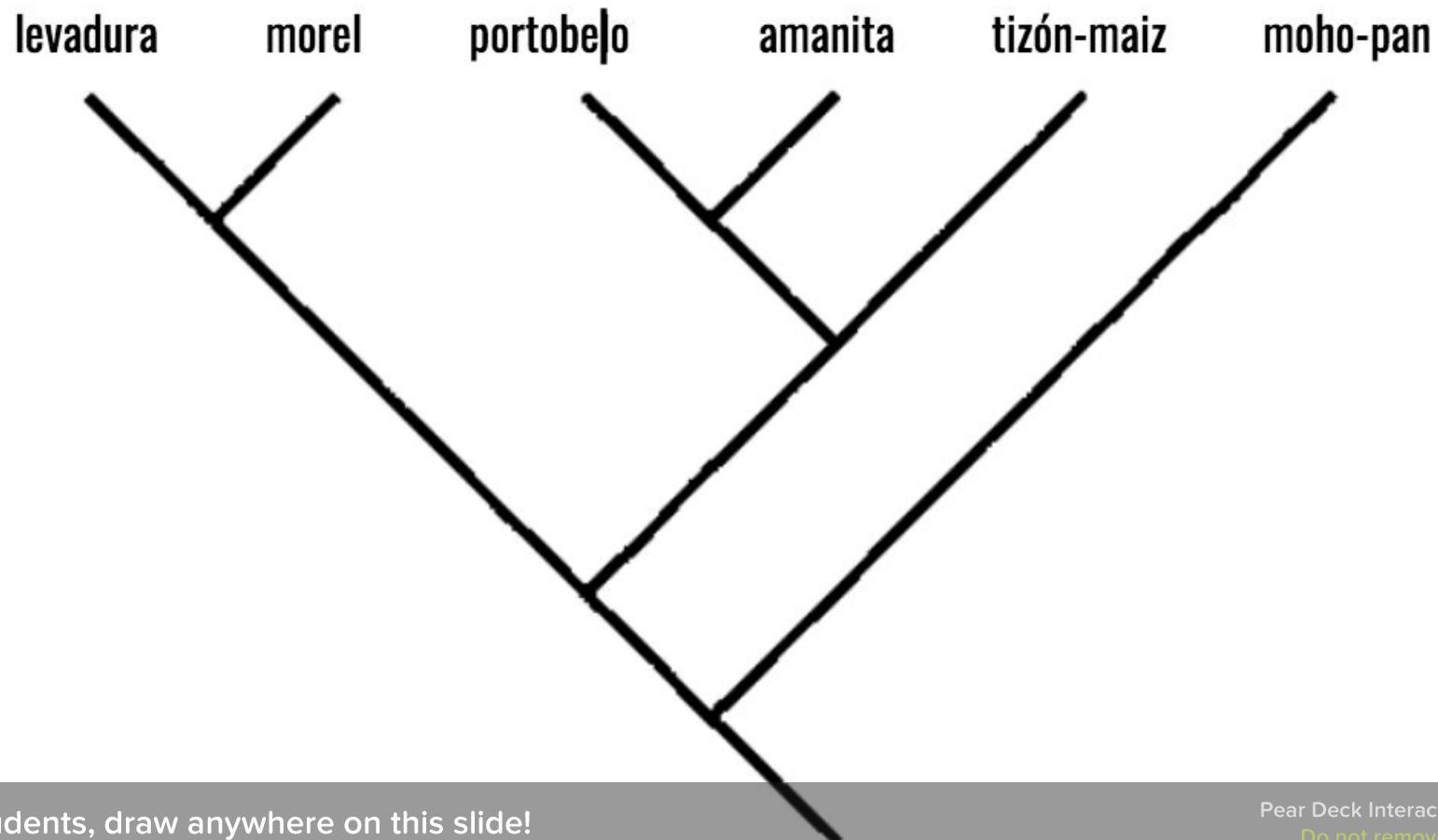
Error 2: juzgar con base al número de nodos

¿Cuál de los cinco nodos etiquetados en el árbol corresponde al ancestro común más reciente de un hongo y una esponja?



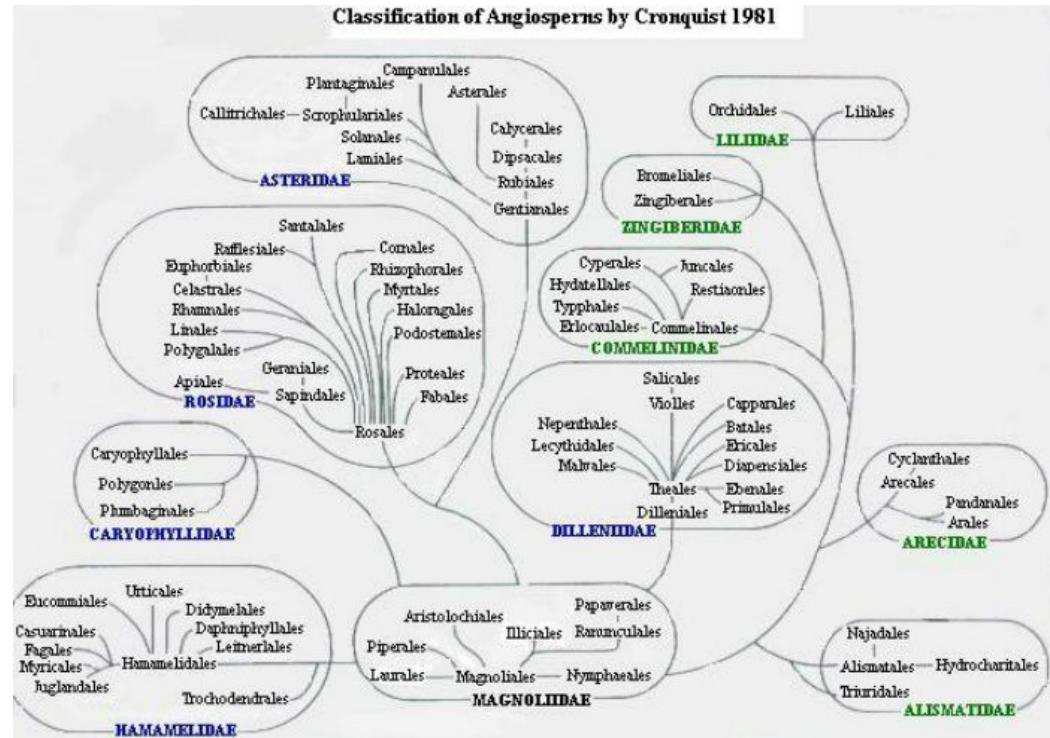
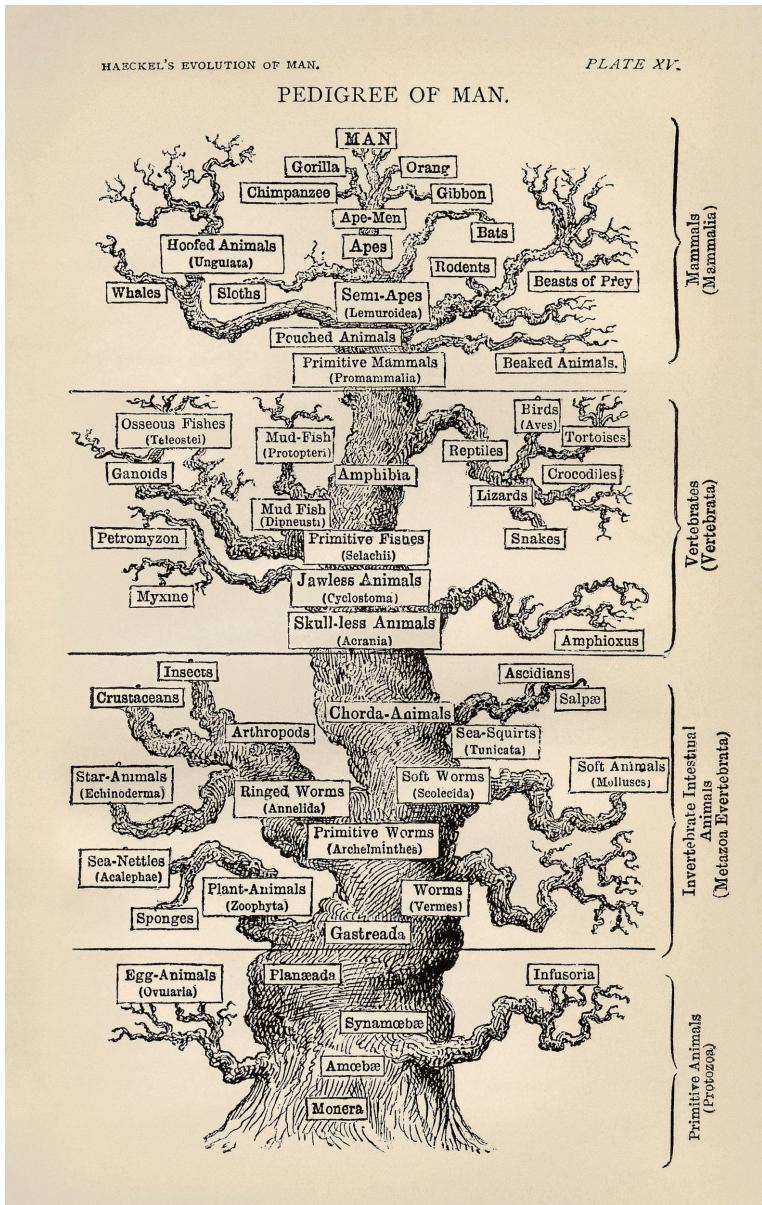
Students choose an option

El clado Dikaryomycota comprende a todos los descendientes del último ancestro común entre morel y amanita. ¿Qué taxones en este árbol no están en Dikaryomycota?

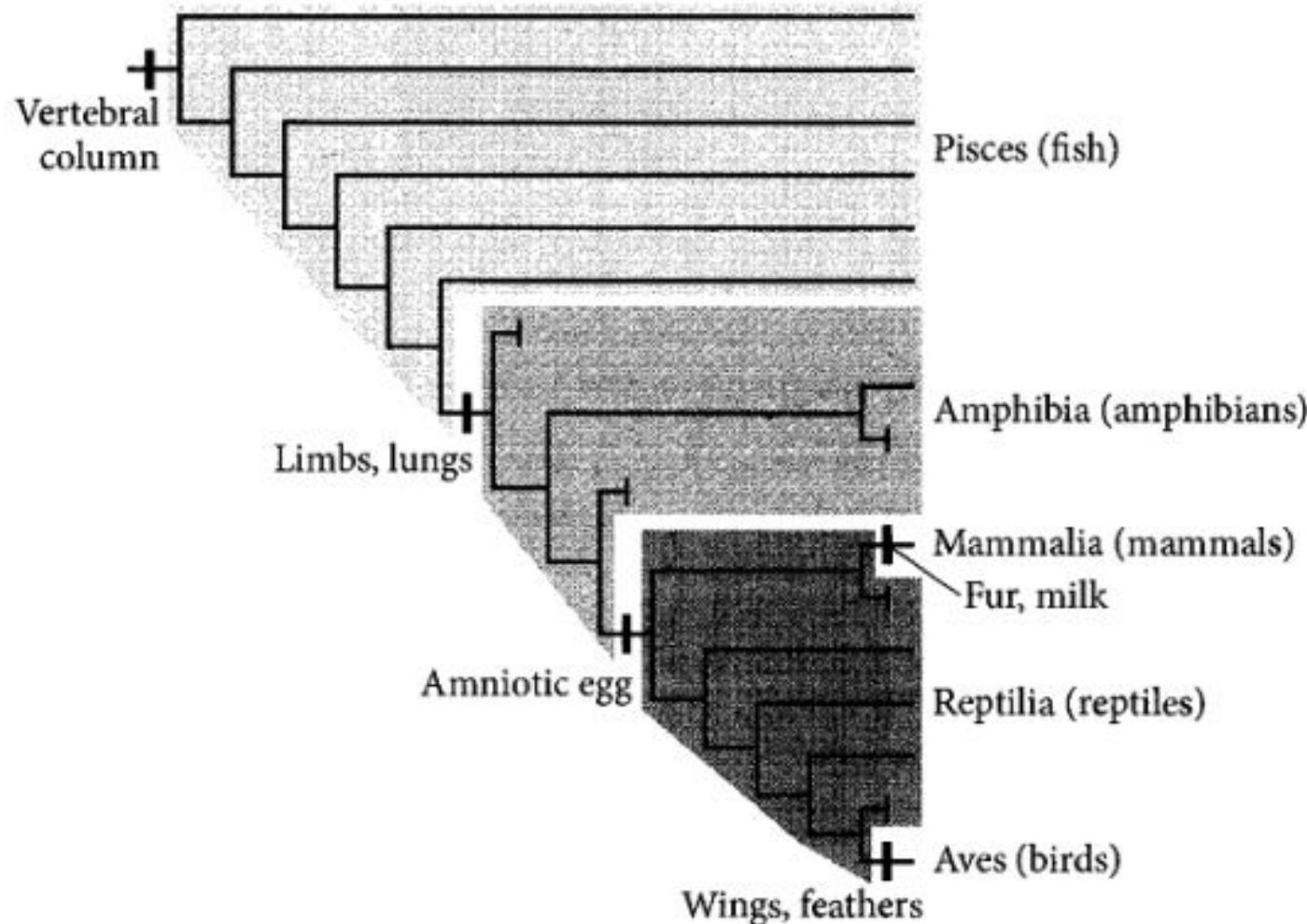


Students, draw anywhere on this slide!

Antiguos sistemas evolutivos de clasificación (series filéticas)



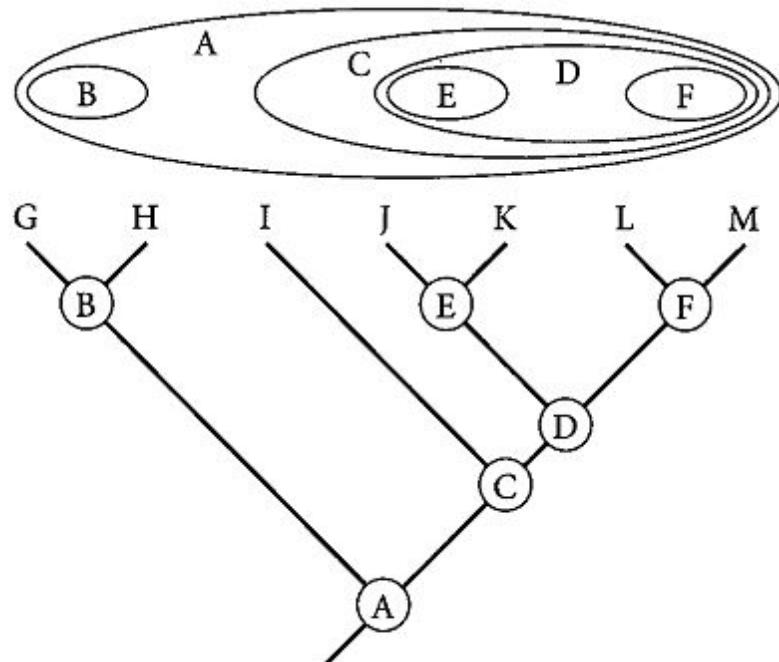
Importancia de la monofilia en sistemática filogenética



Monofilia = Exclusividad

TAXONOMÍA Y ÁRBOLES FILOGENÉTICOS

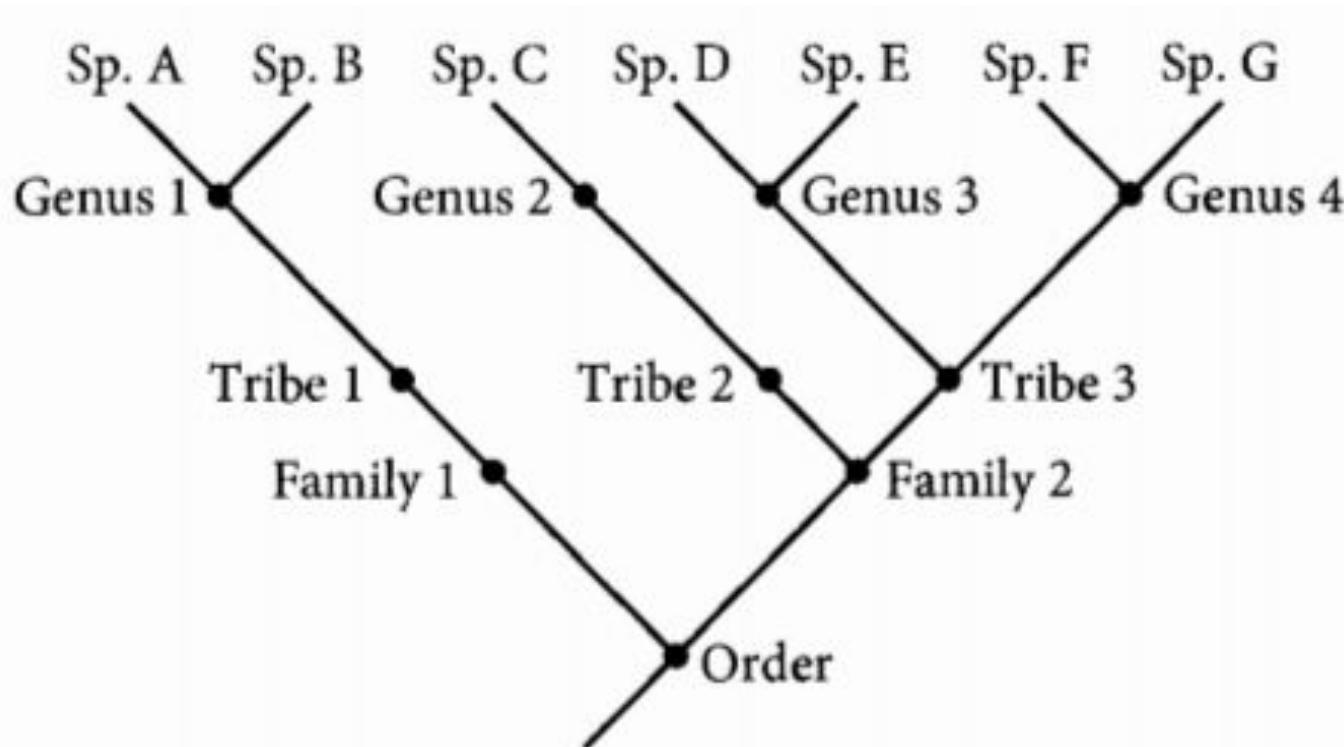
Nombrar clados



Level 1	Level 2	Level 3	Level 4	Level 5
Clade A				
	Clade B			
		Species G		
		Species H		
		Clade C		
			Species I	
			Clade D	
				Clade E
				Species J
				Species K
			Clade F	
				Species L
				Species M

TAXONOMÍA Y ÁRBOLES FILOGENÉTICOS

Determinar rangos taxonómicos jerárquicos



TAXONOMÍA Y ÁRBOLES FILOGENÉTICOS

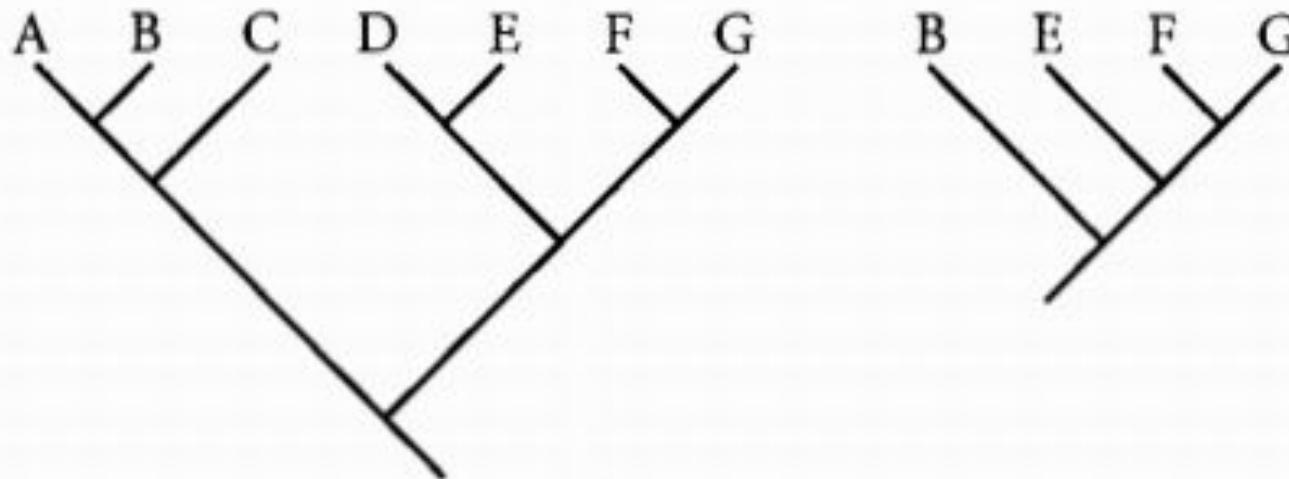
¿Como se determinan los rangos jerárquicos?

PROPUESTAS:

- Cantidad de diversidad morfológica y ecológica
- Número de especies incluidas
- Edad evolutiva del clado
- NOMENCLATURA FILOGENÉTICA = FILOCÓDIGO

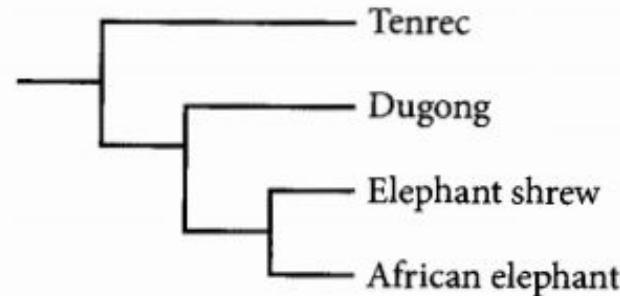
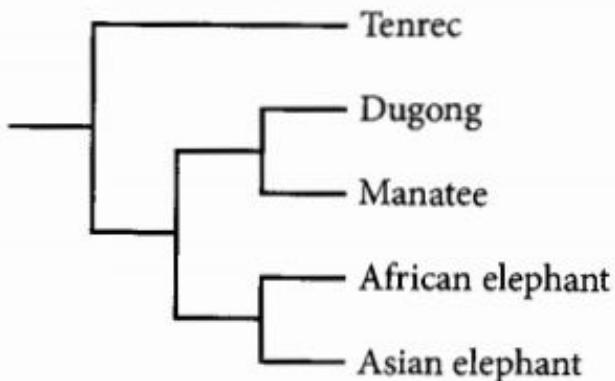
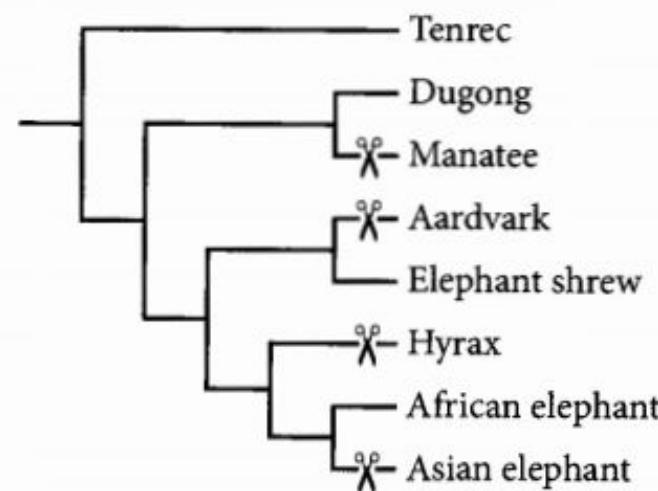
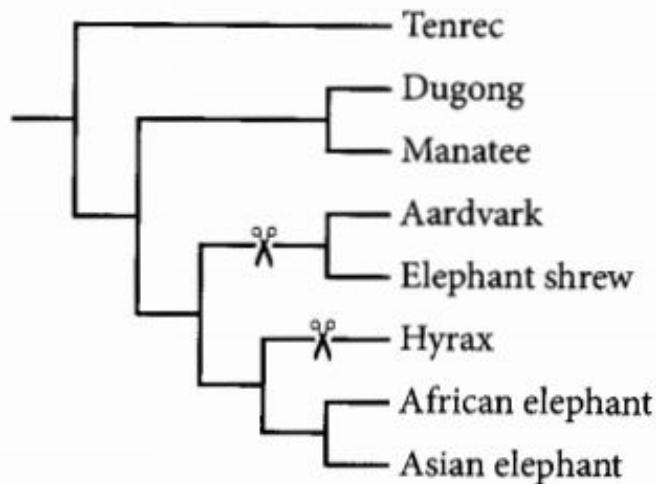
OTROS ATRIBUTOS DE LOS ÁRBOLES

Formas de simplificar árboles

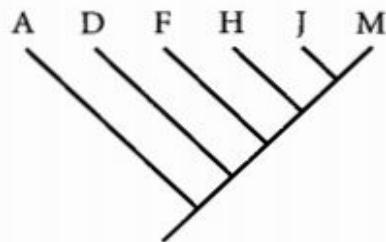
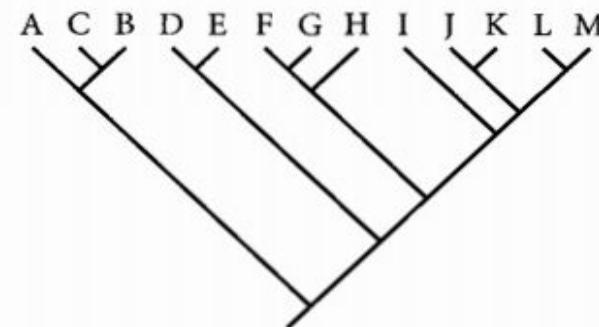


Cortar terminales

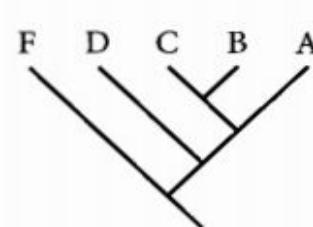
OTROS ATRIBUTOS DE LOS ÁRBOLES



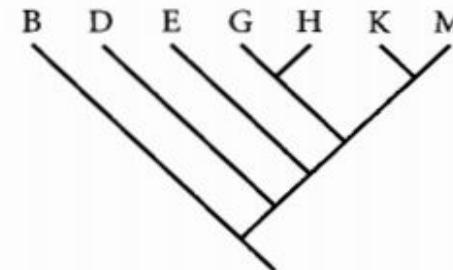
¿Cuál de los cinco árboles pequeños es compatible con el árbol grande?



a



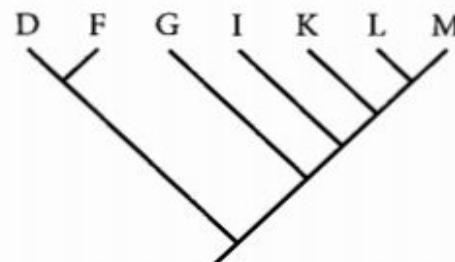
b



c

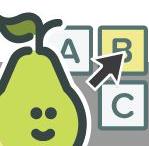


d

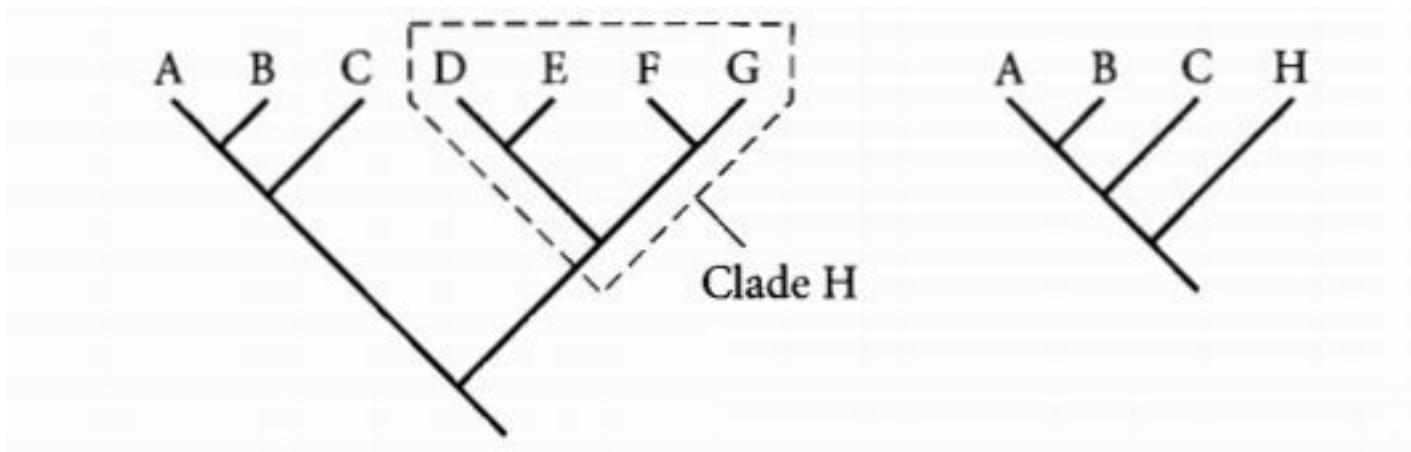


e

Students choose an option

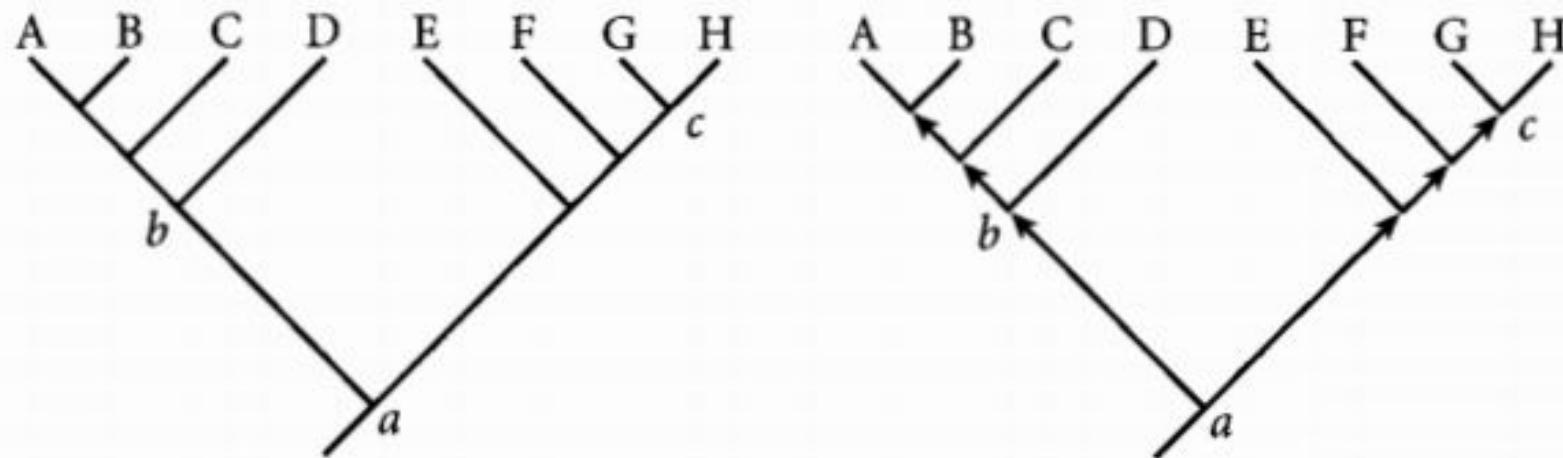


OTROS ATRIBUTOS DE LOS ÁRBOLES

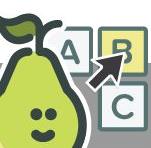


Colapsar clados

OTROS ATRIBUTOS DE LOS ÁRBOLES



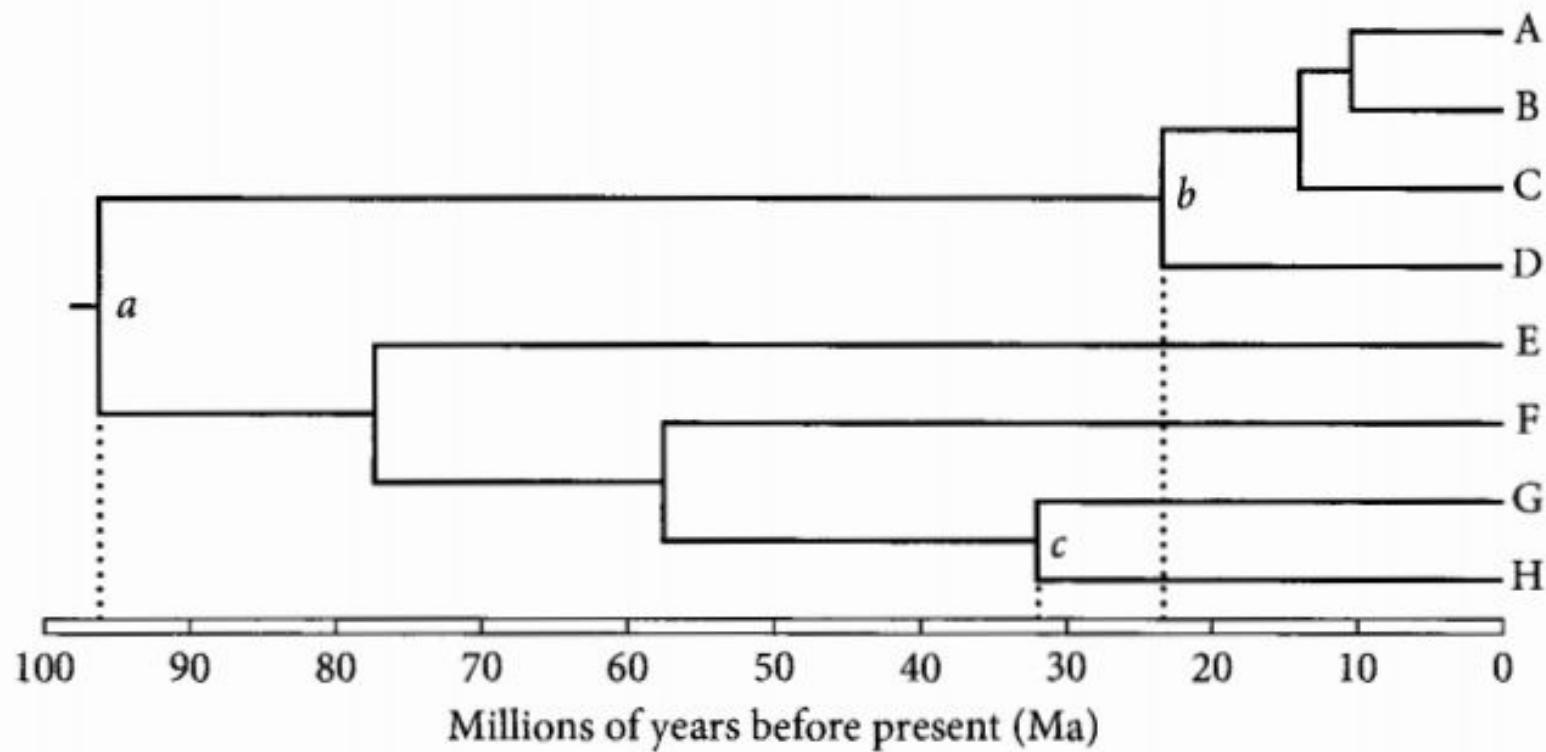
El eje del tiempo



Students choose an option

¿Quién se originó primero: b o c?

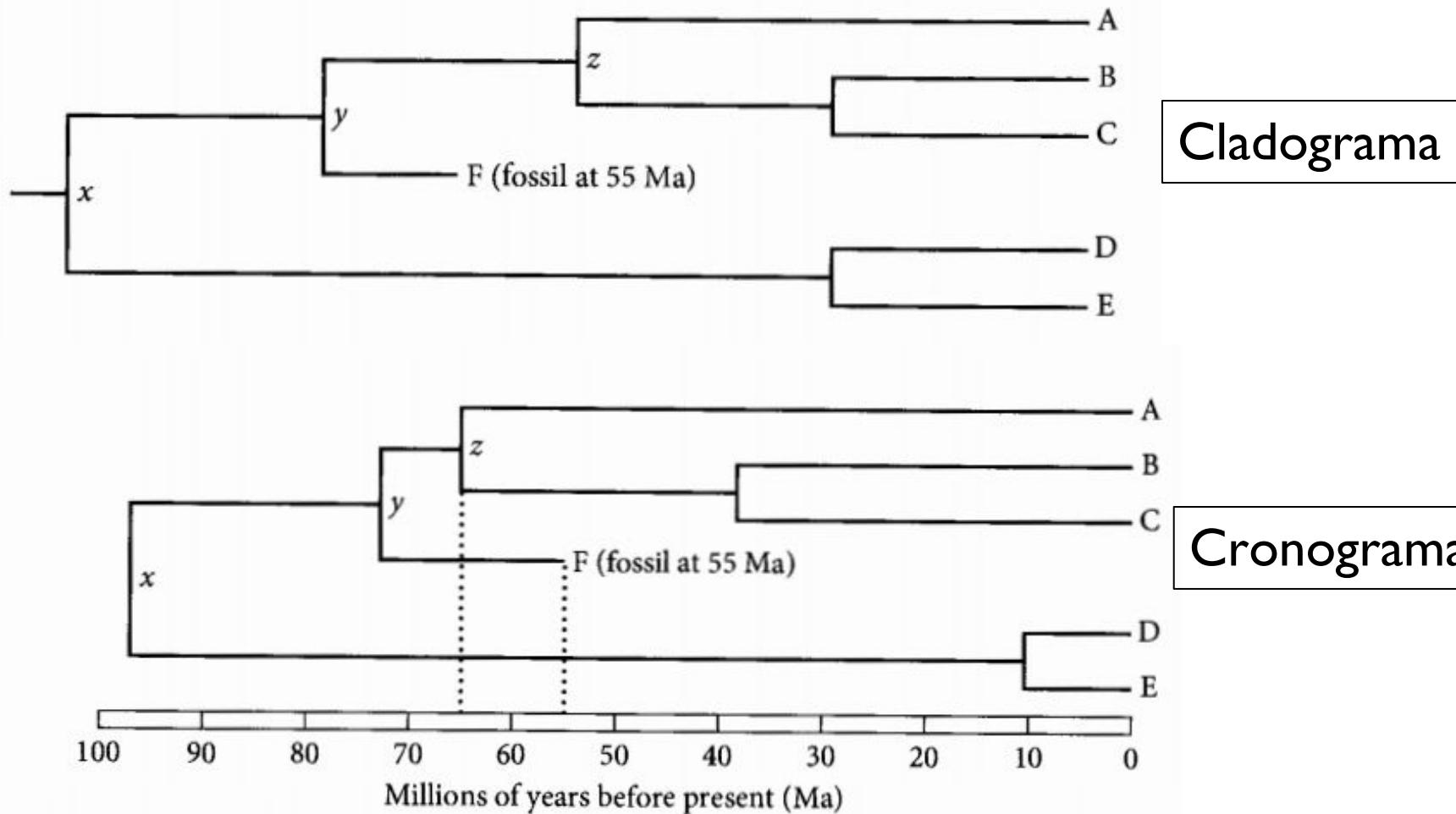
OTROS ATRIBUTOS DE LOS ÁRBOLES



El eje del tiempo

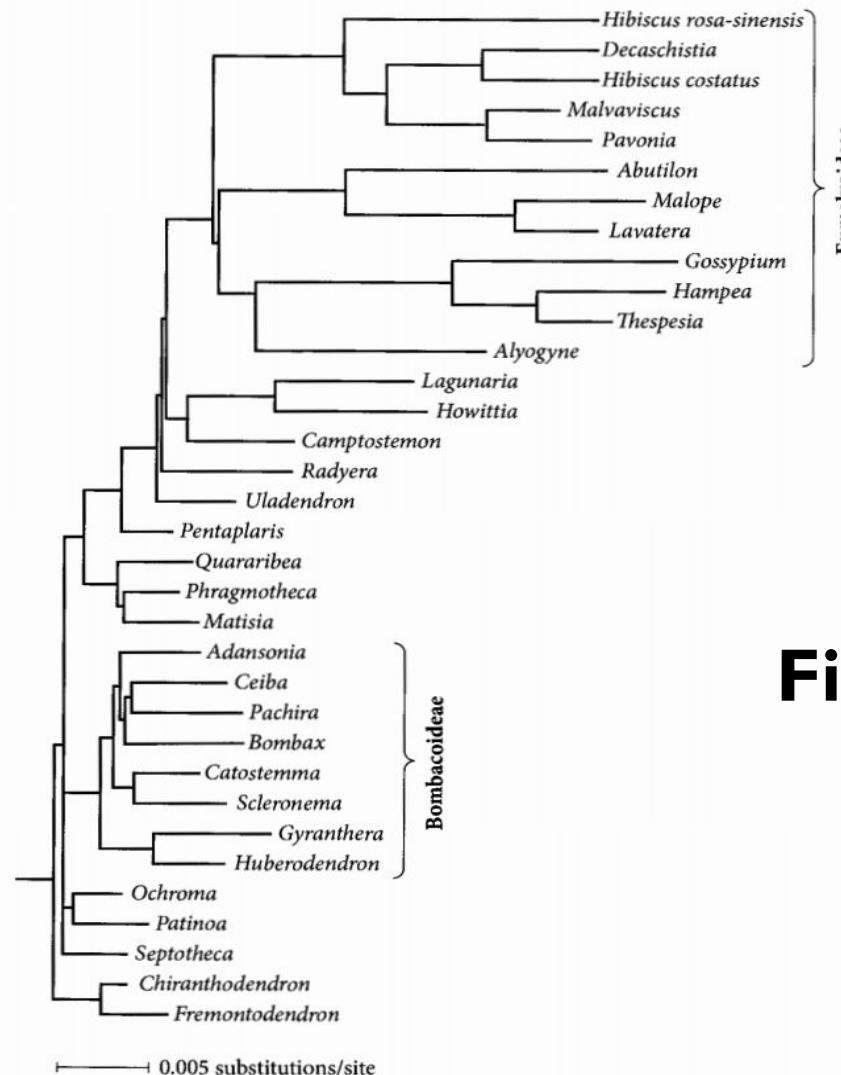
Incorporación de la duración de las ramas: **cronogramas**

OTROS ATRIBUTOS DE LOS ÁRBOLES



Alternativa: asignar edades a nodos o terminales
(ramas no proporcionales a tiempo)

OTROS ATRIBUTOS DE LOS ÁRBOLES

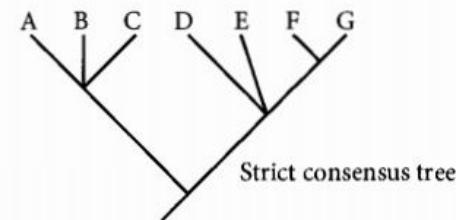
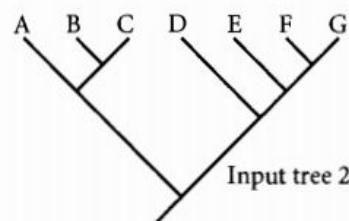
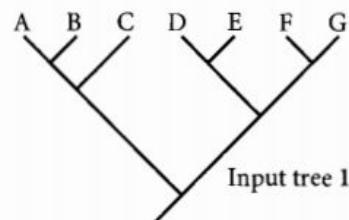
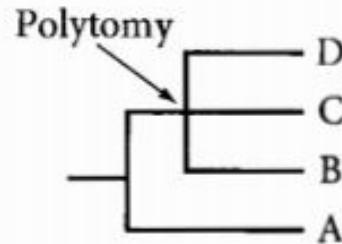
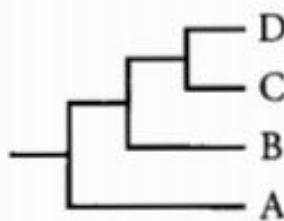
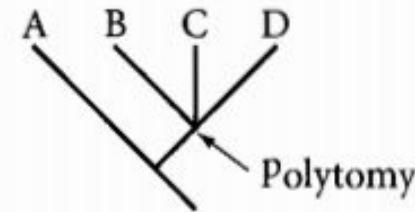
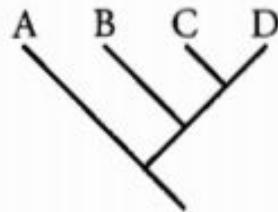


Filograma

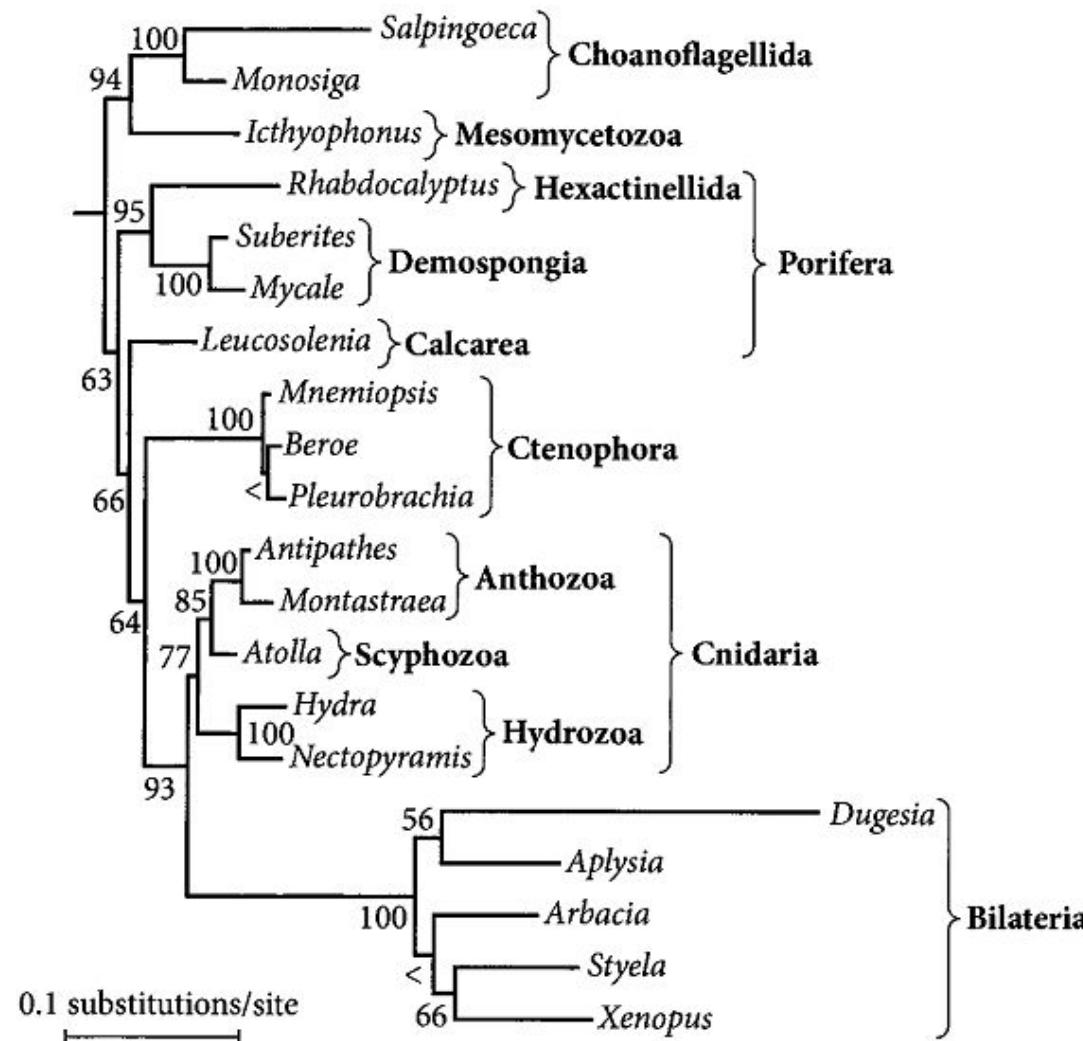
Longitud de ramas: prob. relativa de que un caracter cambie en una rama (promedio de cambios de cada caracter en la matriz)

OTROS ATRIBUTOS DE LOS ÁRBOLES

Incertidumbre

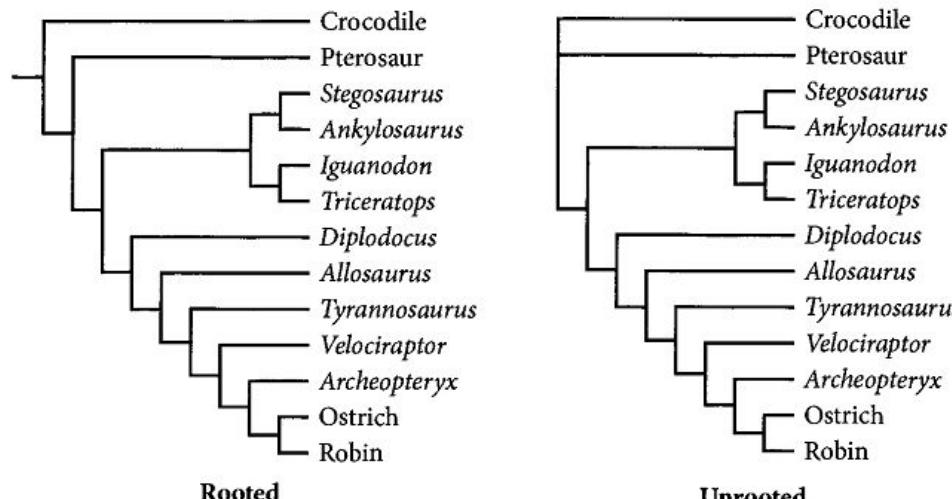


OTROS ATRIBUTOS DE LOS ÁRBOLES



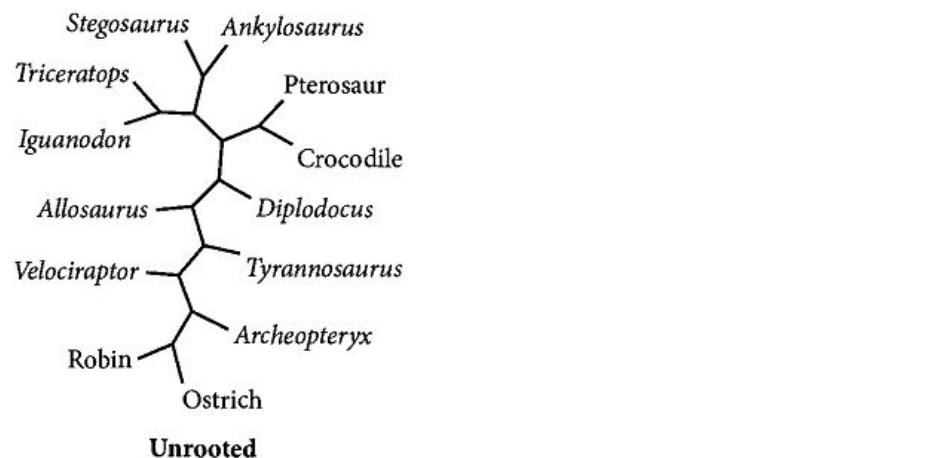
Soporte de los clados

ÁRBOLES NO ENRAIZADOS



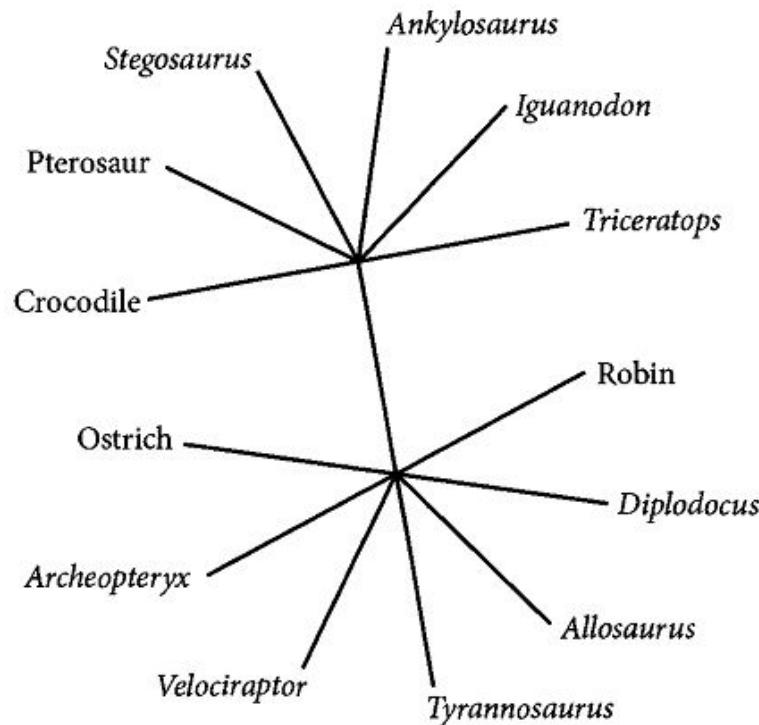
a

b



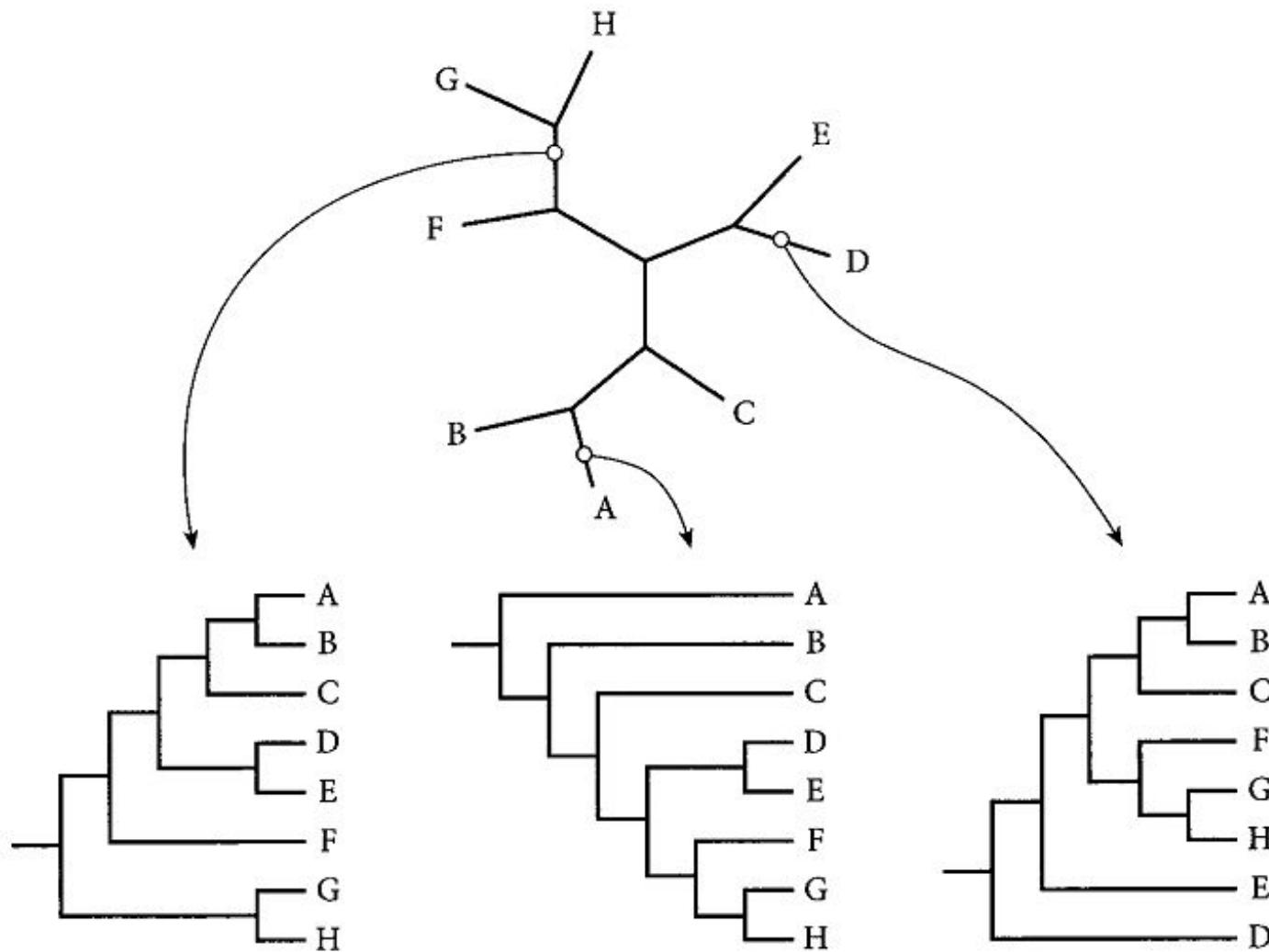
c

ÁRBOLES NO ENRAIZADOS



Biparticiones

ÁRBOLES NO ENRAIZADOS



Enraizamiento usando grupo externo: adición de un nuevo nodo