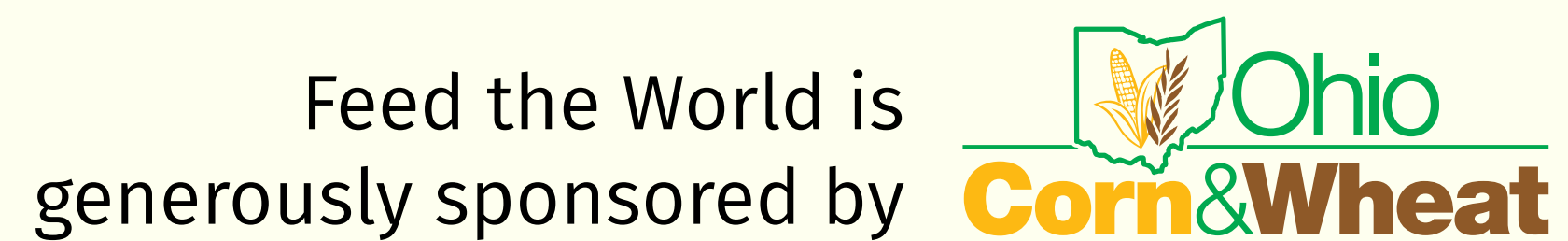




# Starting simple with cladistics





# Cladistics versus phylogeny

<b>Cladogram</b>	<b>Phylogenetic tree</b>
Not an evolutionary tree	Is an evolutionary tree
Represents a hypothesis about the actual evolutionary history of a group	Represents the true evolutionary history of organisms

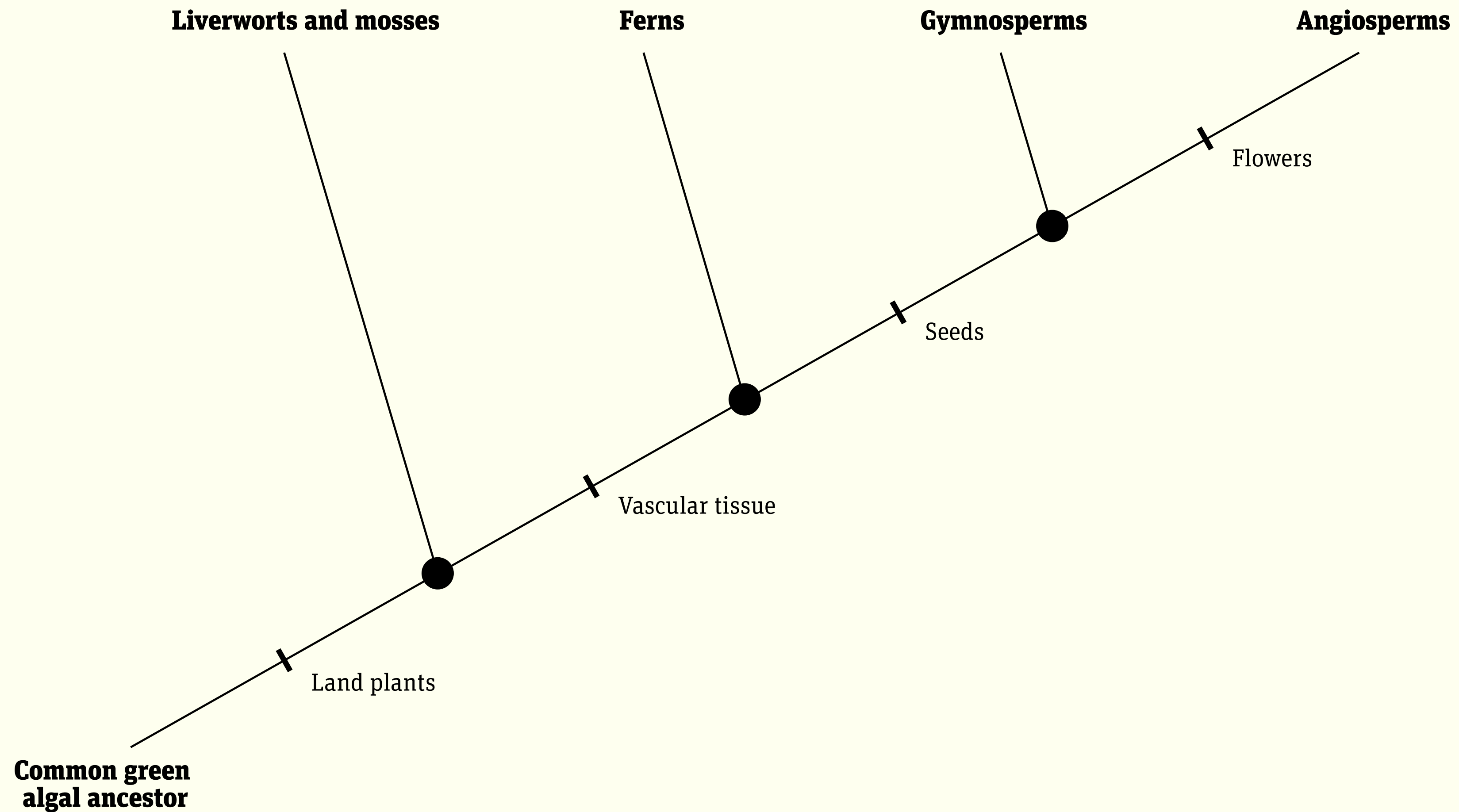
# Cladistics versus phylogeny

<b>Cladogram</b>	<b>Phylogenetic tree</b>
Drawn with equal length	Length of branch indicates the evolutionary distance
Does not indicate the amount of evolutionary time when separating taxa	Indicates the amount of evolutionary time when separating the taxa

# What traits do these organisms have in common?

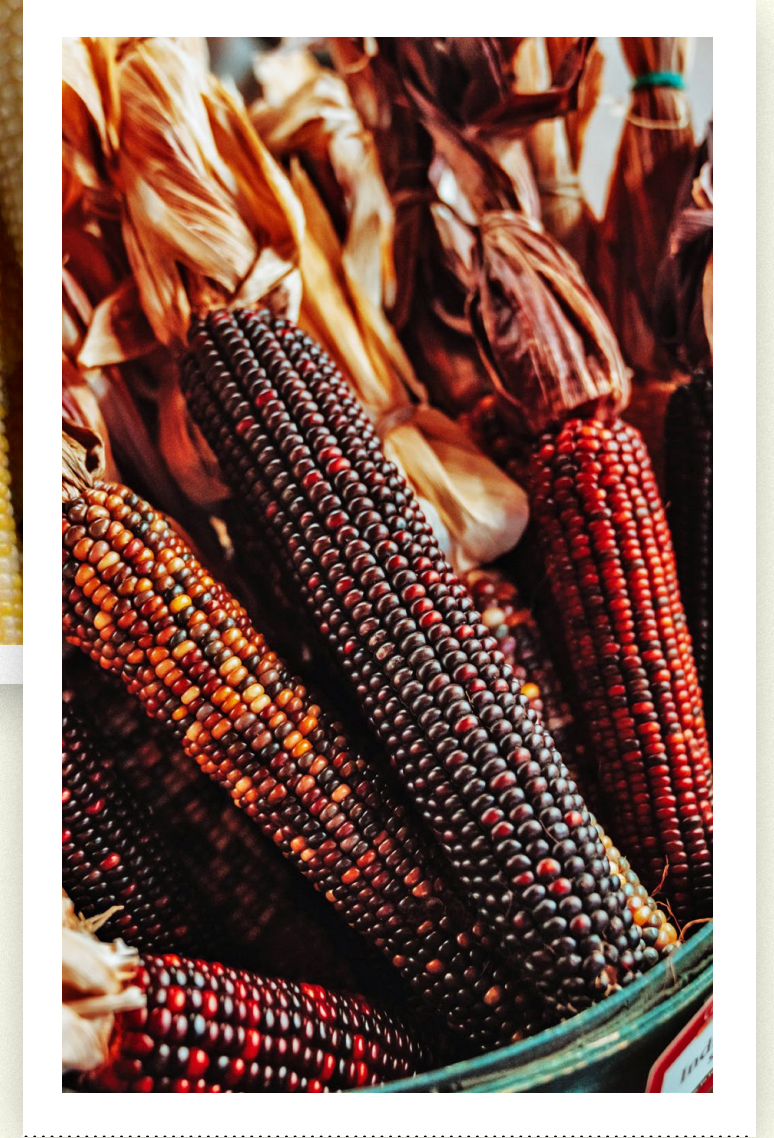
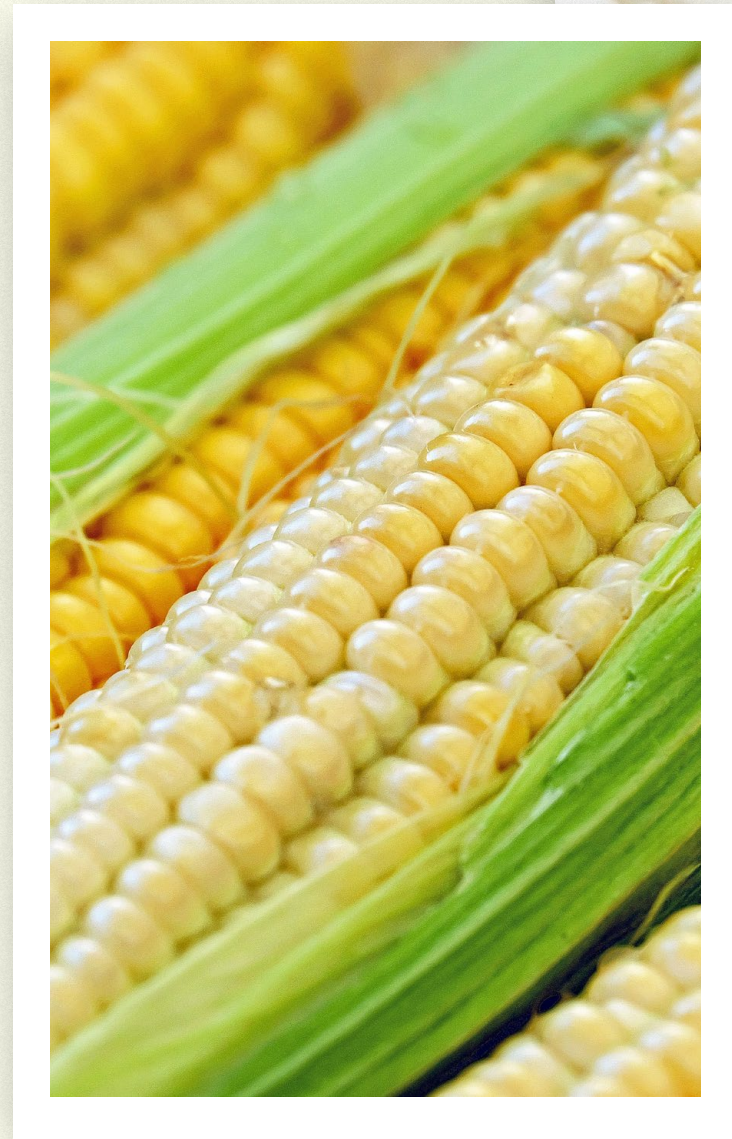
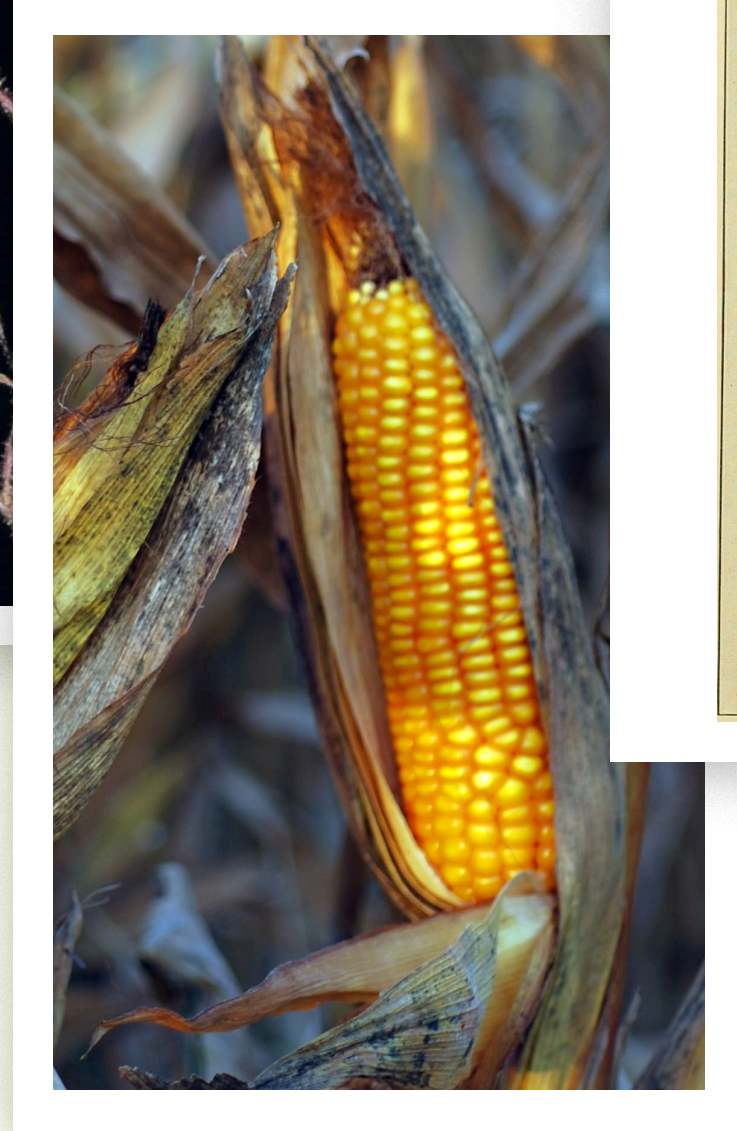
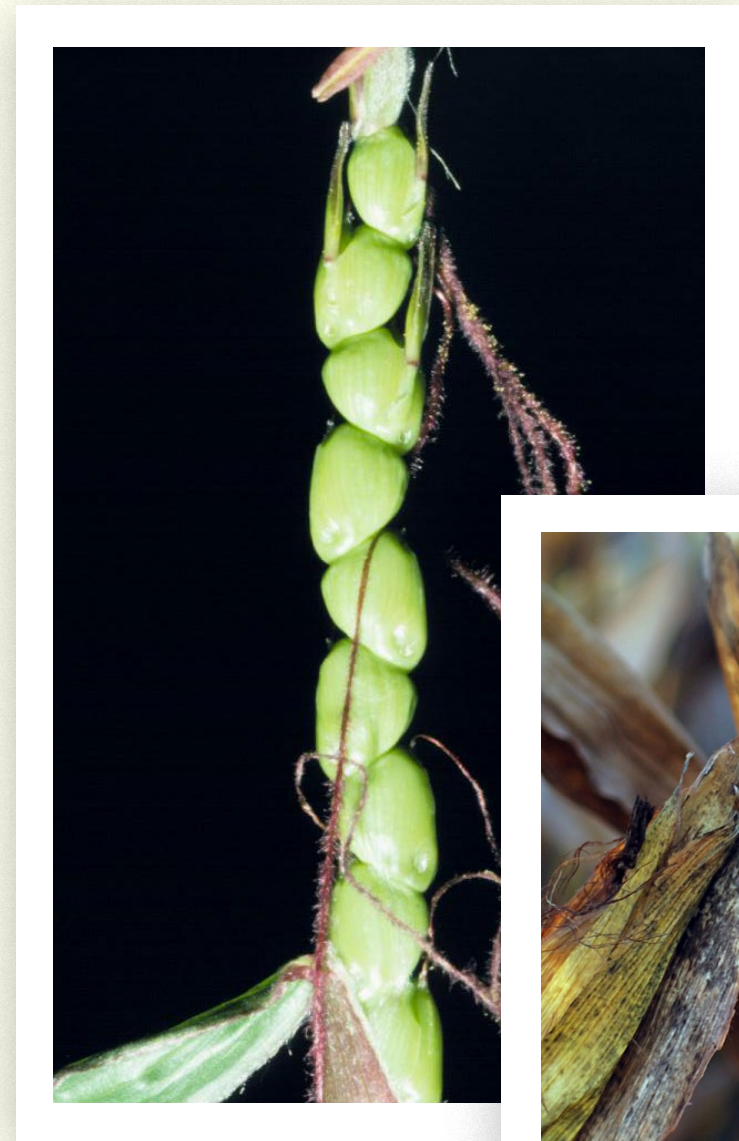
<b>Traits</b>	<b>Common green algae</b>	<b>Liverworts and mosses</b>	<b>Ferns</b>	<b>Gymnosperms</b>	<b>Angiosperms</b>
Land plants		×	×	×	×
Vascular tissue			×	×	×
Seeds				×	×
Flowers					×

# How could we arrange these traits on a cladogram to demonstrate ancestry?



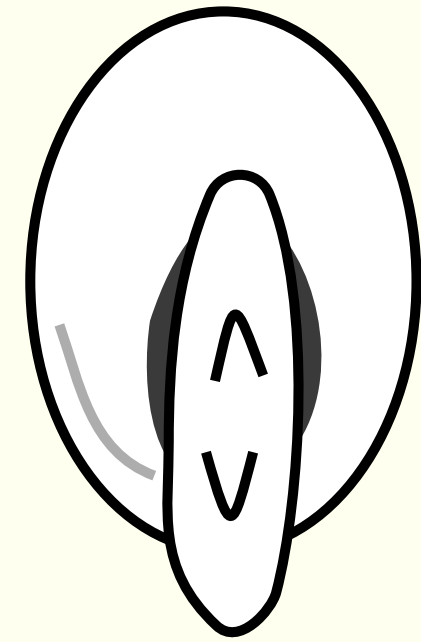
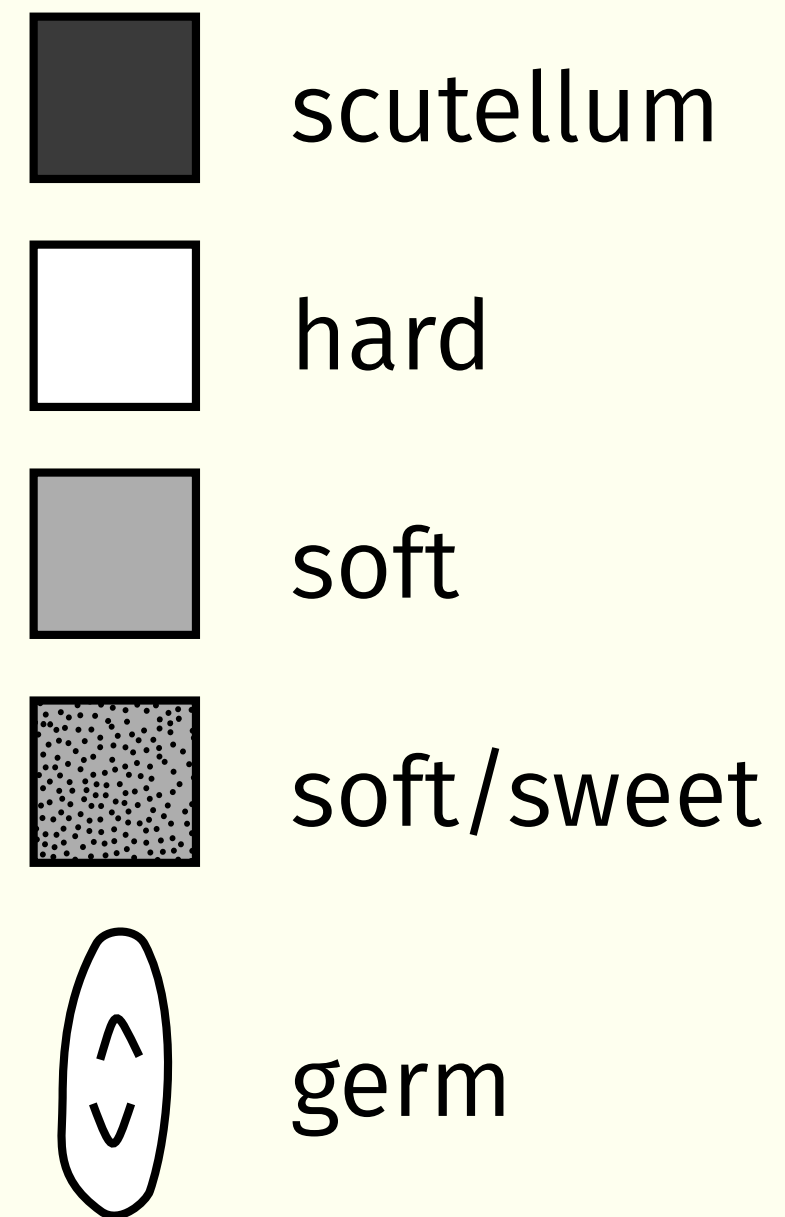


# How should we group the following organisms?

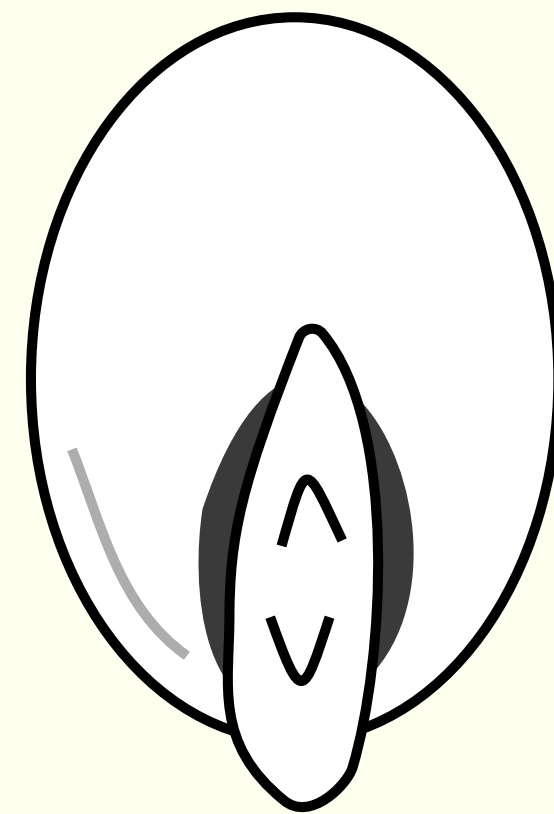




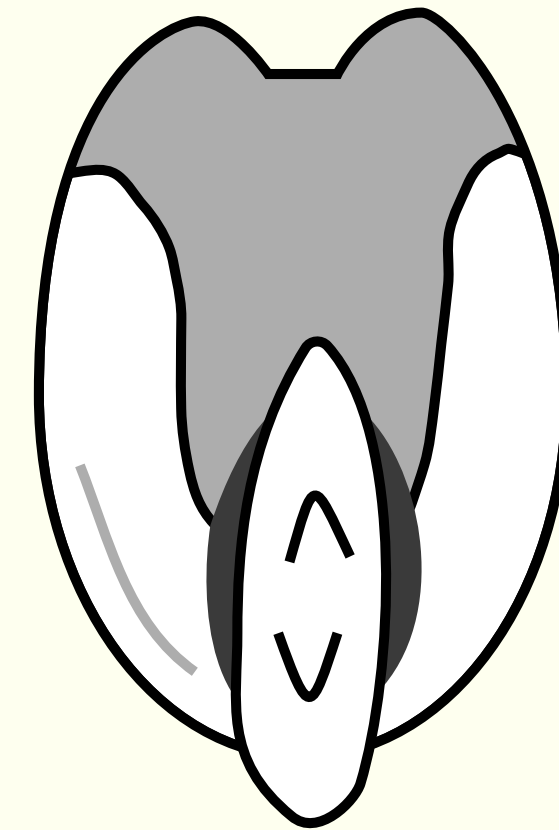
# Kernel anatomy



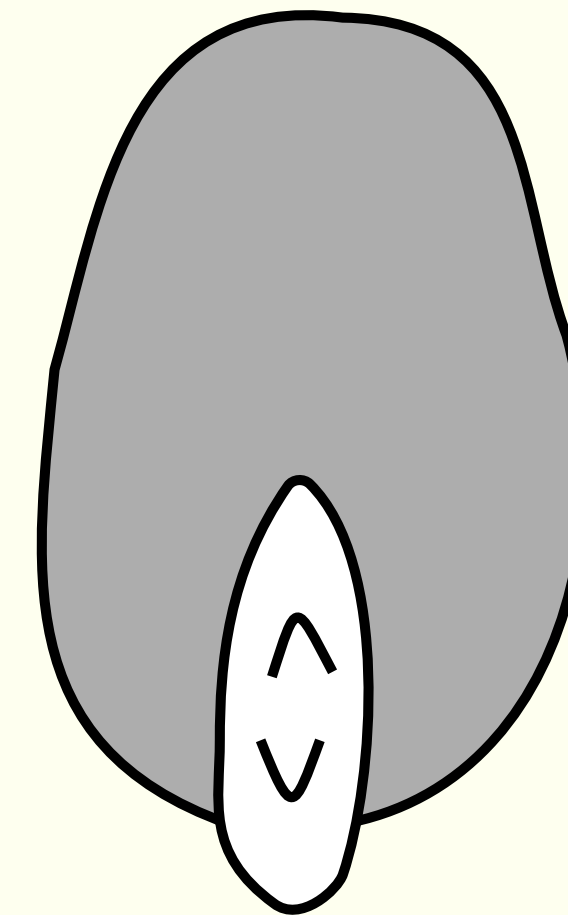
**pop**



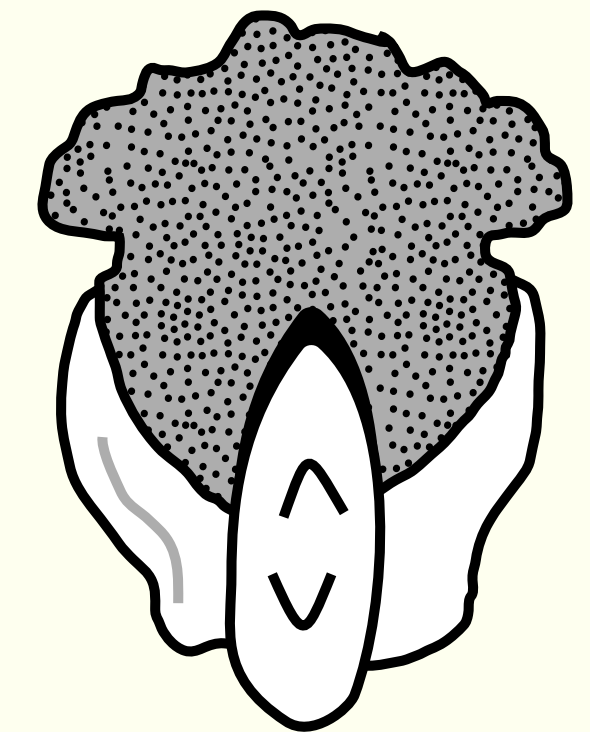
**flint**



**dent**



**flour**



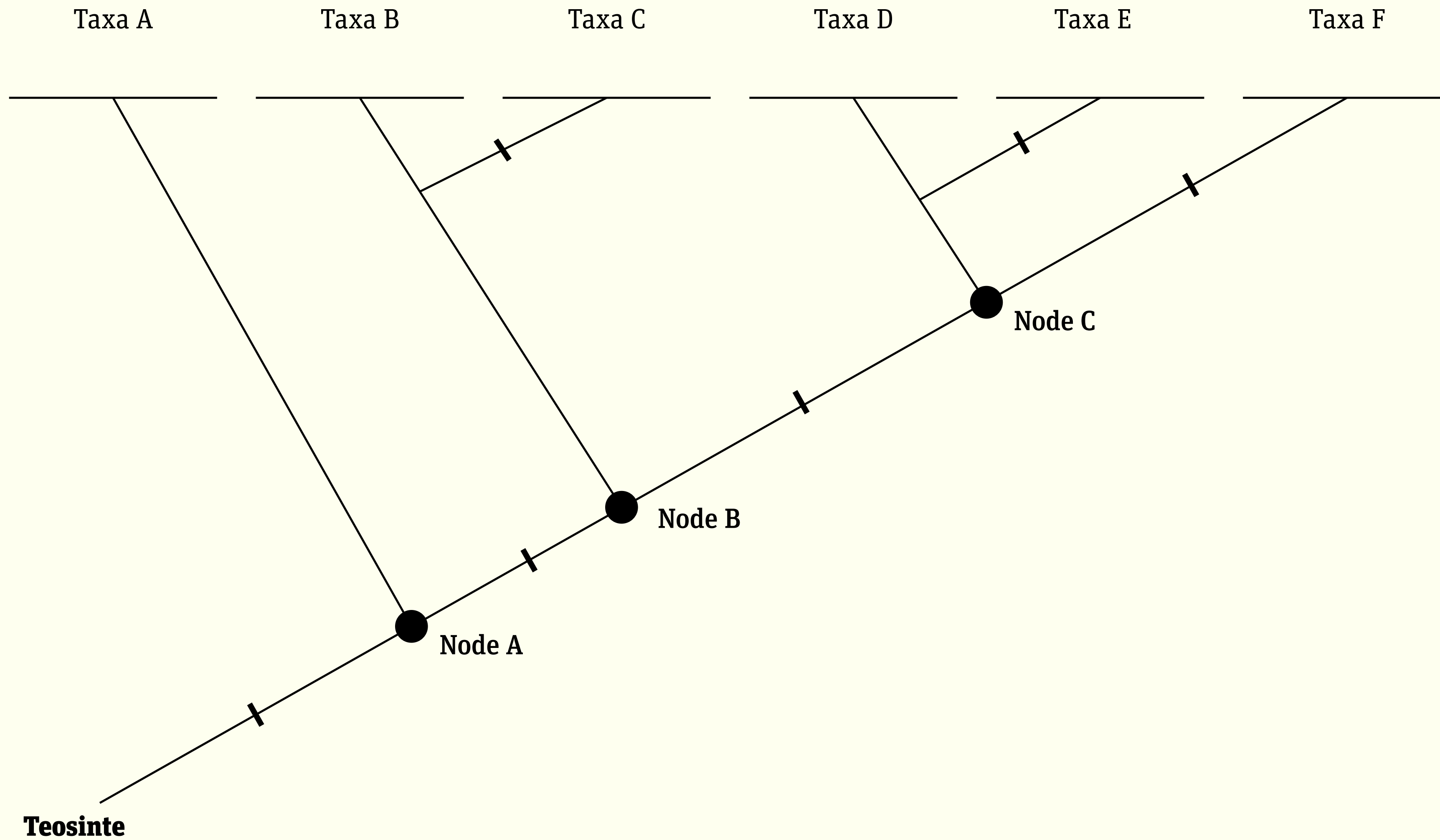
**sweet**

# Corn chart

<b>Traits</b>		<b>Flour</b>	<b>Flint</b>	<b>Dent</b>	<b>Popcorn</b>	<b>Sweet</b>	<b>Teosinte</b>	<b>Pod</b>
Stalk	Multiple							
	Single							
Kernel	Husk							
	Large							
	Small							
Endosperm	Hard							
	Scutellum							
	Sweet							
	Soft							



# Corn cladogram



# Answer key

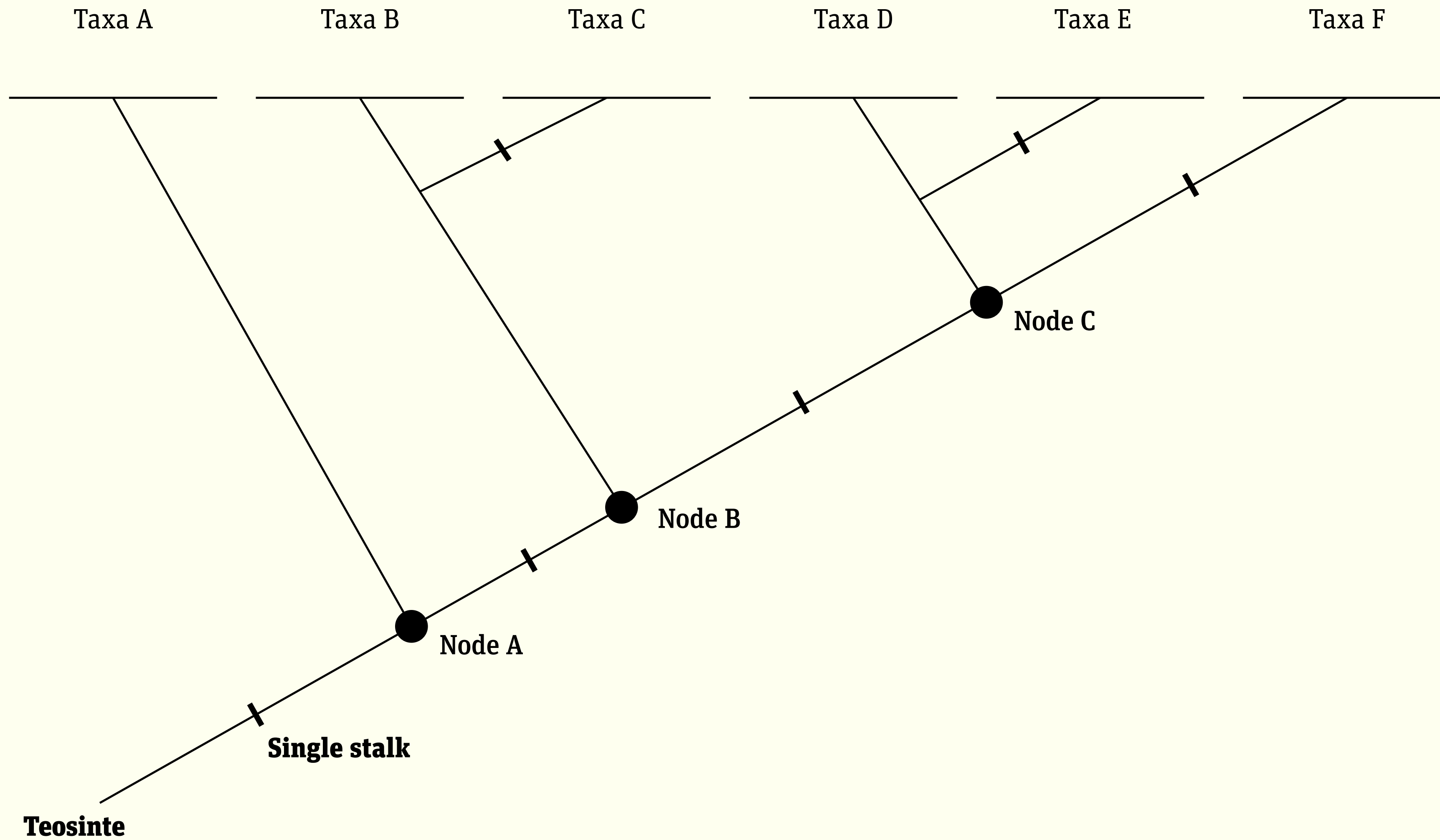
<b>Traits</b>		<b>Flour</b>	<b>Flint</b>	<b>Dent</b>	<b>Popcorn</b>	<b>Sweet</b>	<b>Teosinte</b>	<b>Pod</b>
Stalk	Multiple						×	
	Single	×	×	×	×	×		×
Kernel	Husk						×	×
	Large	×	×	×		×	×	×
	Small				×			
Endosperm	Hard		×		×		×	×
	Scutellum		×	×	×	×	×	×
	Sweet					×		
	Soft	×		×		×		



# Answer key

Traits		Flour	Flint	Dent	Popcorn	Sweet	Teosinte	Pod
Stalk	Multiple						×	
	Single	×	×	×	×	×		×
Kernel	Husk						×	×
	Large	×	×	×		×	×	×
	Small				×			
Endosperm	Hard		×		×		×	×
	Scutellum		×	×	×	×	×	×
	Sweet					×		
	Soft	×		×		×		

# Corn cladogram

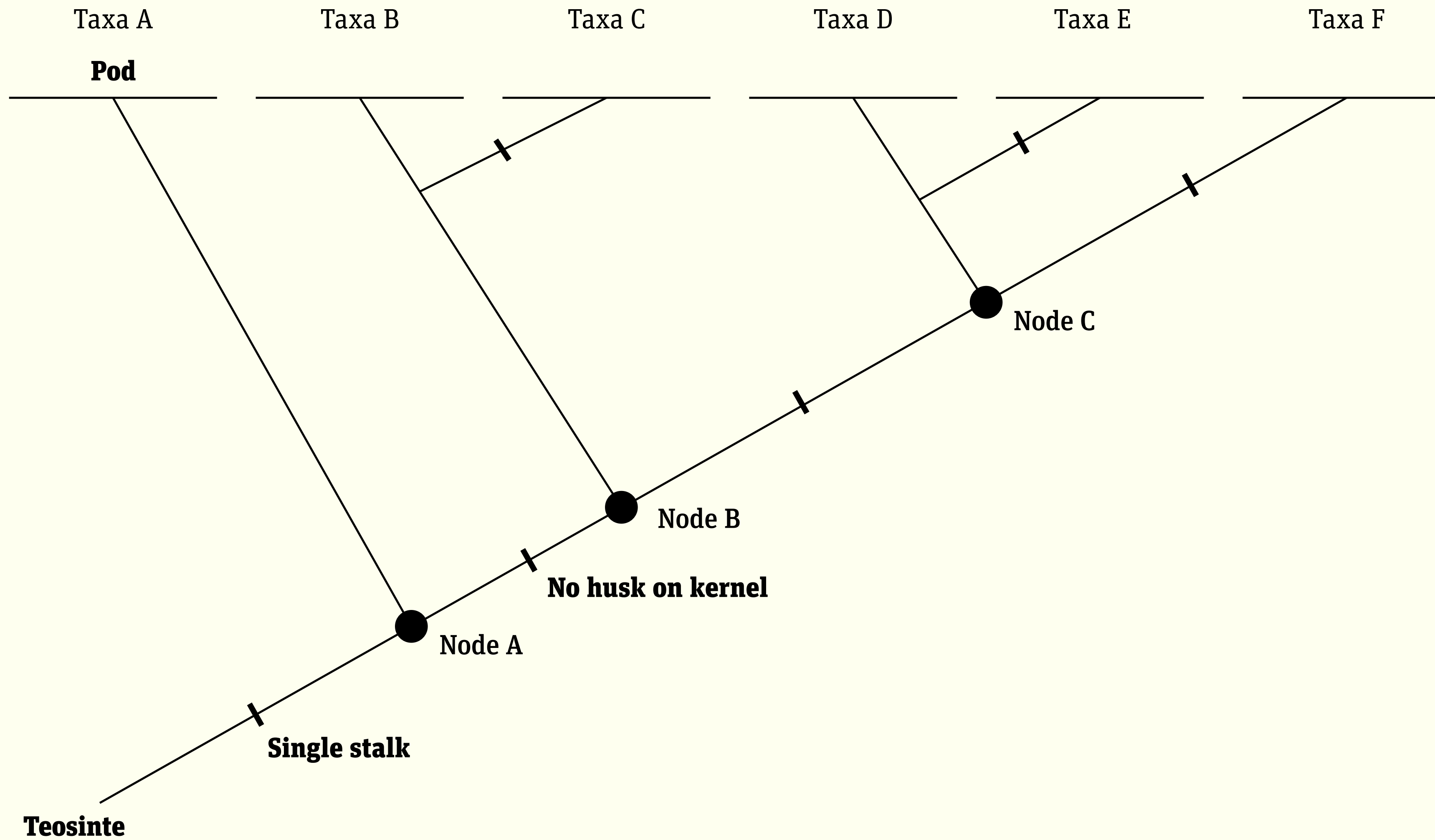




# Answer key

Traits		Flour	Flint	Dent	Popcorn	Sweet	Teosinte	Pod
Stalk	<del>Multiple</del>						✘	
	<del>Single</del>	✘	✘	✘	✘	✘		✘
Kernel	Husk							×
	Large	×	×	×		×	×	×
	Small				×			
Endosperm	Hard		×		×		×	×
	Scutellum		×	×	×	×	×	×
	Sweet					×		
	Soft	×						

# Corn cladogram

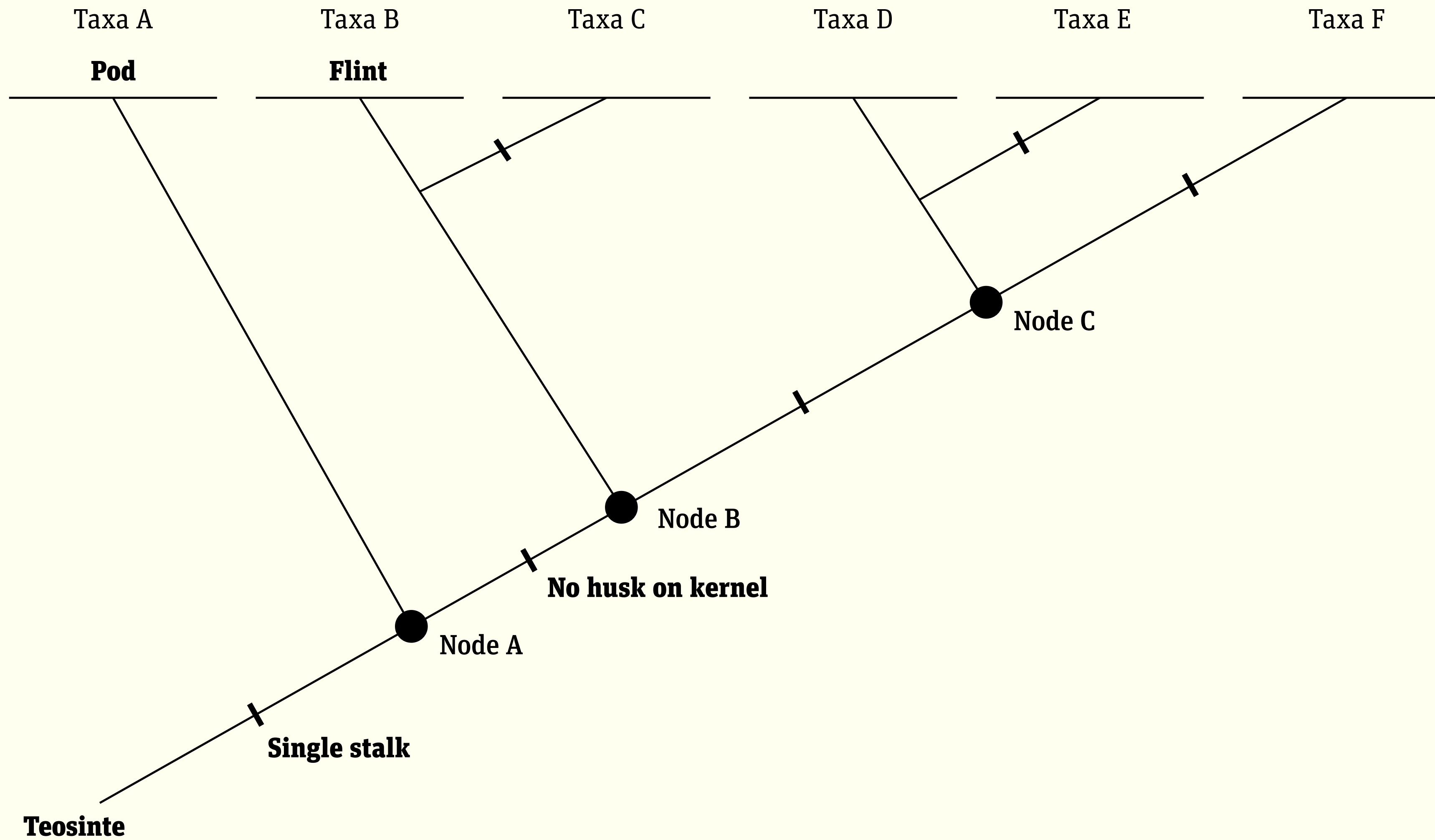




# Answer key

Traits		Flour	Flint	Dent	Popcorn	Sweet	Teosinte	Pod
Stalk	<del>Multiple</del>						✘	
	<del>Single</del>	✘	✘	✘	✘	✘		✘
Kernel	<del>Husk</del>							✘
	Large	×	×	×		×	×	×
	Small				×			
Endosperm	Hard		×		×		×	×
	Scutellum		×	×	×	×	×	×
	Sweet					×		
	Soft	×		×		×		

# Corn cladogram

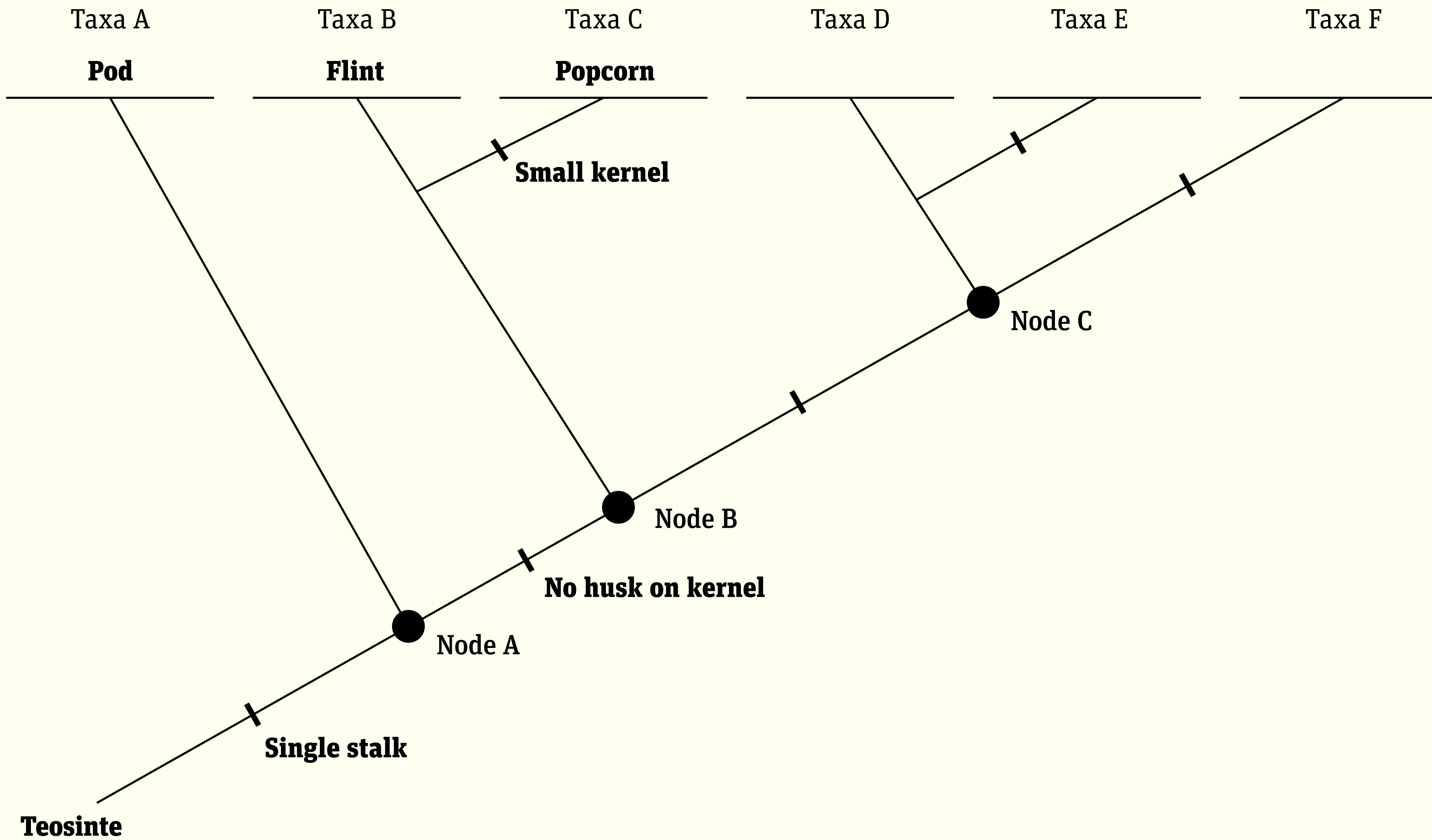


# Answer key

Traits		Flour	Flint	Dent	Popcorn	Sweet	Teosinte	Pod
Stalk	<del>Multiple</del>						✗	
	<del>Single</del>	✗	✗	✗	✗	✗		✗
Kernel	<del>Husk</del>							✗
	Large	×	×	×		×	×	×
	Small				×			
Endosperm	Hard		×		×		×	×
	Scutellum		×	×	×	×	×	×
	Sweet					×		
	Soft	×		×		×		



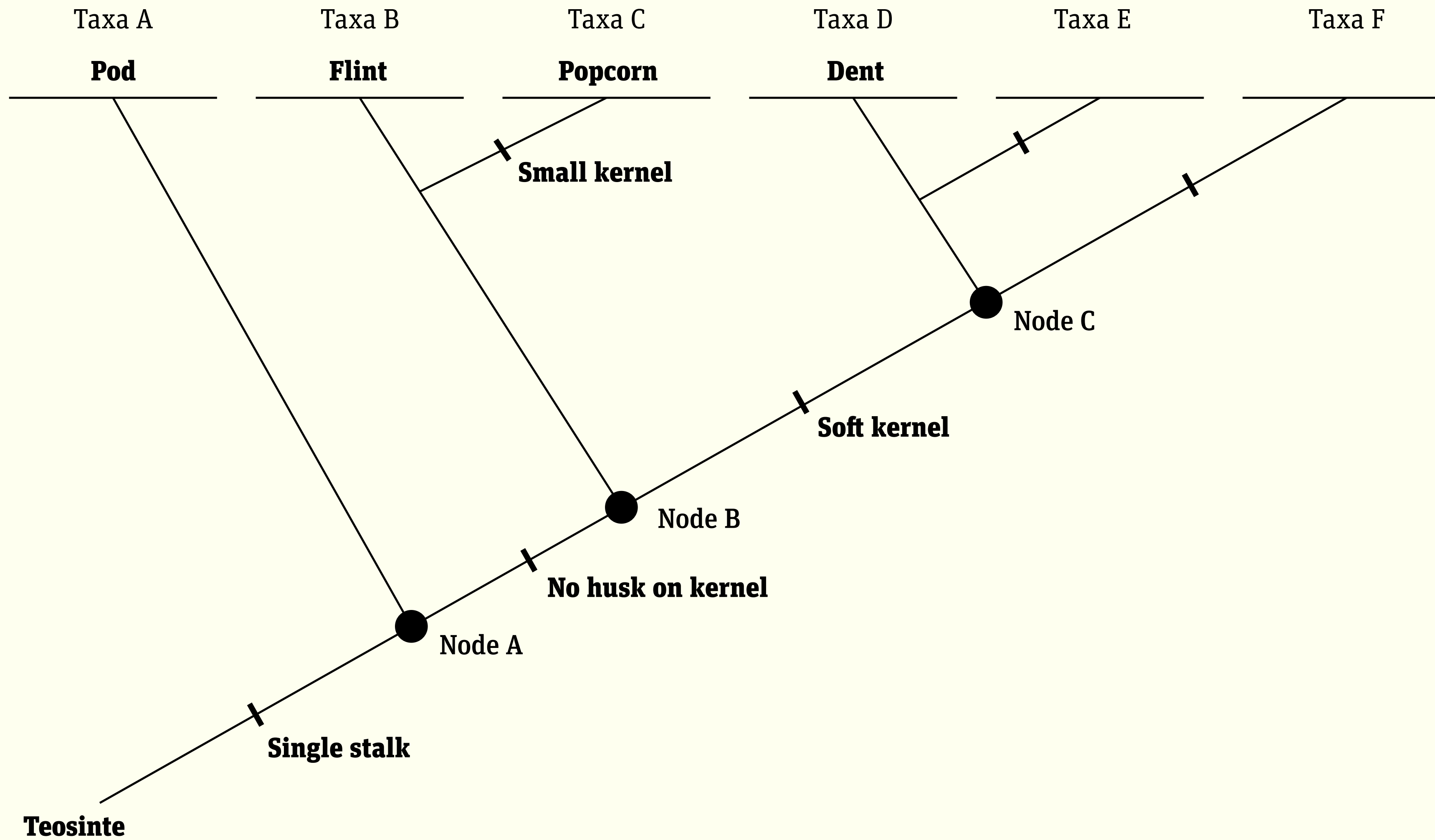
# Corn cladogram



# Answer key

Traits		Flour	Flint	Dent	Popcorn	Sweet	Teosinte	Pod
Stalk	<del>Multiple</del>						✗	
	<del>Single</del>	✗	✗	✗	✗	✗		✗
Kernel	<del>Husk</del>							✗
	<del>Large</del>	✗	✗	✗		✗	✗	✗
	<del>Small</del>				✗			
Endosperm	<del>Hard</del>		✗		✗		✗	✗
	Scutellum		×	×	×	×	×	×
	Sweet					×		
	Soft	×		×		×		

# Corn cladogram

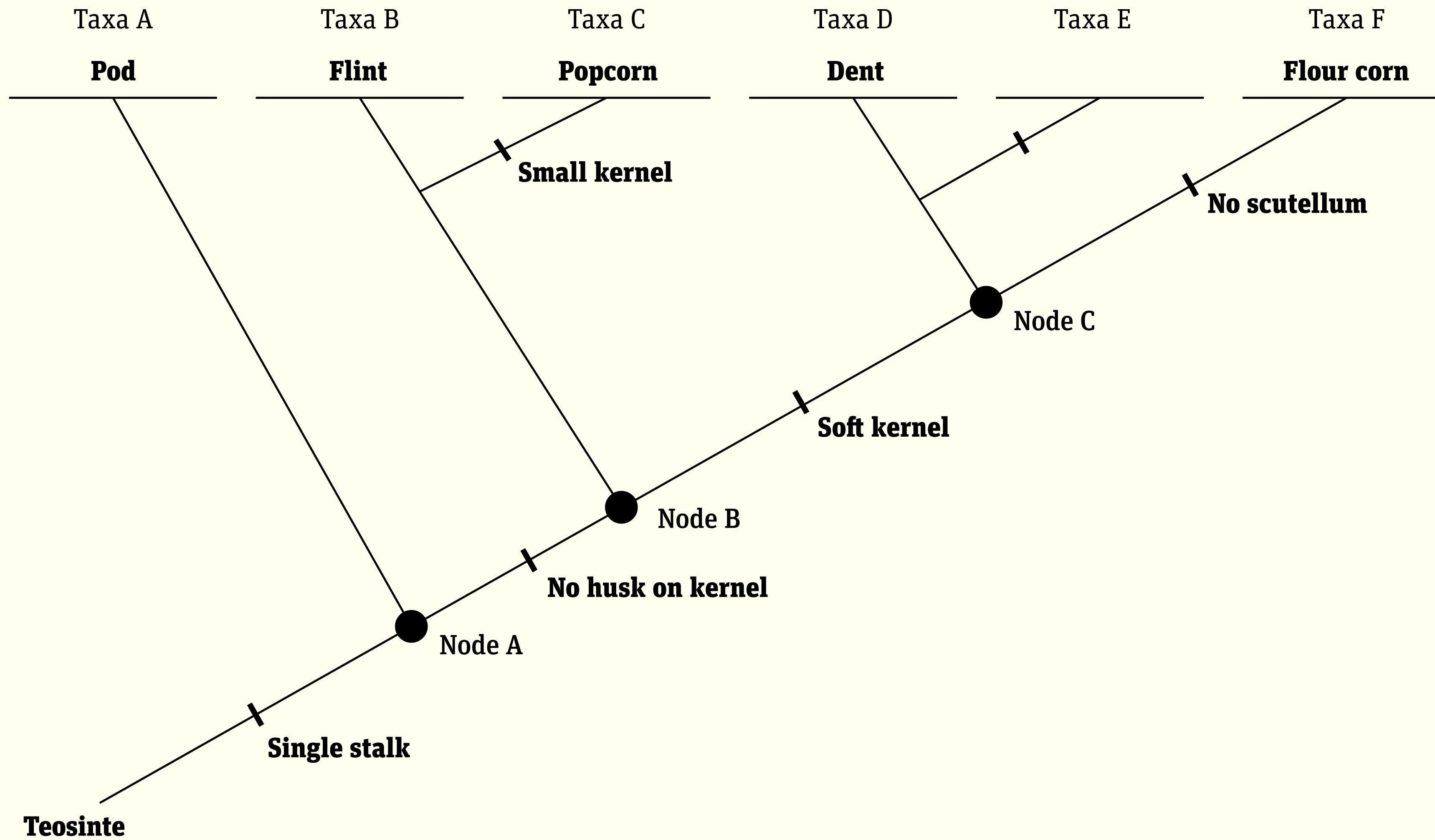




# Answer key

Traits		Flour	Flint	Dent	Popcorn	Sweet	Teosinte	Pod
Stalk	<del>Multiple</del>						✗	
	<del>Single</del>	✗	✗	✗	✗	✗		✗
Kernel	<del>Husk</del>							✗
	<del>Large</del>	✗	✗	✗		✗	✗	✗
	<del>Small</del>				✗			
Endosperm	<del>Hard</del>		✗		✗		✗	✗
	Scutellum		×	×	×	×	×	×
	Sweet					×		
	Soft	✗		✗		✗		

# Corn cladogram



# Answer key

Traits		Flour	Flint	Dent	Popcorn	Sweet	Teosinte	Pod
Stalk	<del>Multiple</del>						✘	
	<del>Single</del>	✘	✘	✘	✘	✘		✘
Kernel	<del>Husk</del>							✘
	<del>Large</del>	✘	✘	✘		✘	✘	✘
	<del>Small</del>				✘			
Endosperm	<del>Hard</del>		✘		✘		✘	✘
	Scutellum		✘	✘	✘	✘	✘	✘
	Sweet					✘		
	Soft	✘		✘		✘		



# Corn cladogram

