## Supplemental Material CBE—Life Sciences Education

Bokor et al.

Supplemental Table 1. Characteristics Chart: Ten possible characters for each species used for the morphological analyses.

Species	Character 1 Color (Red)	Character 2 Color (Blue)	Character 3 Flower size	Character 4 Tubular flower	Character 5 Symmetry	Character 6 Petal lobes fused	Character 7 Stamens exserted	Character 8 Horizontal Orientation	Character 9 Individual flowers	Character 10 Scent	# of traits
	0= not red 1=red	0=not blue 1=blue	0=small 1=large	0=not tubular 1=tubular	0=radial (wheel) 1=bilateral (mirror images)	0=not fused 1=fused	0=not exserted past petals 1=exserted	0=not horizontal flowers =horizontal flower	0=flower clusters 1=individual flowers	0=no scent 1=scent	
Maltese											
Cross											
Cardinal climber											
Petunia											
Snapdragon											
California											
poppy											
Empress of India											
Blue Daze											
Pentas											
Lantana											
Vinca											
Blue Flax											
Nicotiana											

## **Supplemental Table 2.** Distance Matrix

Species	Maltese Cross	Cardinal climber	Petunia	Snapdragon	California poppy	Empress of India	Blue Daze	Pentas	Lantana	Vinca	Blue Flax	Nicotiana
Maltese Cross	X											
Cardinal climber		X										
Petunia			X									
Snapdragon				X								
California poppy					X							
Empress of India						X						
Blue Daze							X					
Pentas								X				
Lantana									X			
Vinca										X		
Blue Flax											X	
Nicotiana												X

## Supplemental Table 3. Module Assessment Items

- 1) True or **False**: When scoring a particular floral trait, such as flower orientation, everyone scores that trait the same for each and every species.
- 2) Two species are most likely their closest relatives if:
- a) Their flowers are the same color and size
- b) Phylogeny from molecular data supports them being closely related
- c) They are found in the same geographic area
- d) All of the above
- 3) You are part of a four-person research team performing a phylogenetic analysis with 100 species. Which method would you choose and why? Support your decision.
- a) 50 morphological characters (morphological phylogeny)
- b) One gene consisting of 1,500 base pairs of DNA (molecular phylogeny)
- Possible supporting answers: do not have to worry about everyone scoring characters the same, takes less time to gather data, results usually more robust than with morphology
- 4) What is the correct order of techniques needed to determine relatedness of individuals using molecular data?
- a) PCR, DNA extraction, gel electrophoresis, phylogenetic analysis
- b) Phylogenetic analysis, gel electrophoresis, DNA extraction, PCR
- c) DNA extraction, PCR, gel electrophoresis, phylogenetic analysis
- d) Gel electrophoresis, DNA extraction, phylogenetic analysis, PCR
- 5) What is gel electrophoresis?
- a) Denaturing proteins into their gel state
- b) Identifying pieces of DNA by sequence
- c) Making Jello by using electricity to link the molecules
- d) Passing electricity through a gel to separate molecules by size

Note: Correct item response in bold.