Name _____ **Period _____**

Regents Biology **Date _____**

EVOLUTIONARY RELATIONSHIPS

1. The instructions for completing this lab are included in the separate document entitled "Relationships and Biodiversity".

2. All questions for this lab are included in this document and **all** answers should be written ***only*** in this packet. **No** questions should be answered in the packet entitled "Relationships and Biodiversity".

3. Only this completed packet needs to be handed in for credit on this lab.

4. As you complete each separate test in this lab record the data in this packet and answer the questions for that section. Then move on to the next test only when your teacher states that it is time to do so.

Name _____ **Regents Biology**

	Structural Evidence			Molecular Evidence			
Species	**Structural Characteristics of Plants (description)**	**Structural Characteristics of Seeds (description)**	**Microscopic Structural Characteristics of Stem (location of vascular bundles)**	**Paper Chromatography (number & description of bands)**	**Test for Enzyme M (reaction: Yes or No)**	**Differences in Amino Acid Sequence (number different from *B. curus*)**	**Gel Electrophoresis (number & location of bands)**
Botana curus							
Species X							
Species Y							
Species Z							

PHYSICAL / STRUCTURAL EVIDENCE

STRUCTURAL CHARACTERISTICS OF PLANTS, SEEDS, AND STEMS

1. Did all the plants have the same physical characteristics? Explain.

_____

_____

_____

2. Did all the seeds have the same physical characteristics? Explain.

_____

_____

_____

3. Did all the stems have the same physical characteristics? Explain.

_____

_____

_____

4. Based on your data of the physical characteristics, which species (X, Y, or Z) would you hypothesize is most likely to produce Curol? Explain how the evidence supports your hypothesis.

_____ _____

_____

_____

_____

AMINO ACID SEQUENNCE

Botana curus

DNA sequence	CAC	GTG	GAC	TGA	GGA	CTC	CTC
mRNA sequence							
Amino acid sequence							

Species X

DNA sequence	CAC	GTG	GAC	AGA	GGA	CAC	CTC
mRNA sequence							
Amino acid sequence							

Species Y

DNA sequence	CAC	GTG	GAC	AGA	GGA	CAC	CTC
mRNA sequence							
Amino acid sequence							

Species Z

DNA sequence	CAC	GTA	GAC	TGA	GGA	CTT	CTC
mRNA sequence							
Amino acid sequence							

10. Do all the plants have the same DNA sequence for this protein? Explain why that is.

_____

_____

_____

11. What do you look for in a DNA or amino acid sequence of two different species to decide whether or not they are closely related?

_____

_____

_____

12. Which sequences are the most closely aligned? _____

_____

Name _____ Regents Biology

GEL ELECTROPHORESIS TEST

– negative pole	Botana curus	Species X	Species Y	Species Z
DNA wells →				
size in base pairs ↓				
24				
23				
22				
21				
20				
19				
18				
17				
16				
15				
14				
13				
12				
11				
10				
9				
8				
7				
6				
5				
4				
3				
2				
1				

+ positive pole

13. What chemical was the DNA treated with before being used in the gel electrophoresis procedure? Why?

_____

_____

14. What causes the pieces of DNA to migrate to different positions on the gel?

_____

_____

15. Do all the plants have the same banding pattern on the gel? Explain why that is.

_____

_____

_____

16. How does a gel electrophoresis show you that two species are closely related?

_____

_____

_____

SUMMARY QUESTIONS

17. Using the information in all your test determine which plant is most related to *Botana curus*. Explain your choice by citing evidence from your tests.

_____

_____

_____

18. Which kind of evidence — structural or molecular — was more helpful in determining the evolutionary relationships between the plants? Explain why.

_____

_____

_____

19. Based on your observations, list three characteristics that all the plants shared in common.

a. _____

b. _____

c. _____

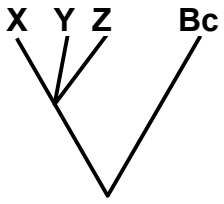
20. Provide a biological explanation for why all the species shared these three characteristics.

_____

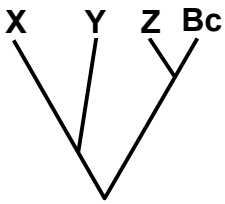
_____

_____

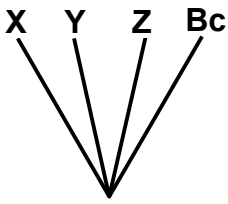
21. Scientists use branching tree diagrams to represent the evolutionary relationships between species. Choose one of the diagrams below that best represents the relationship between these four species.



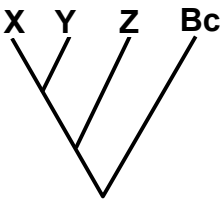
A.



B.



C.



D.

22. Explain how the data from this lab led you to choose this specific diagram.

_____

_____

_____

_____