

# Pre-AP Biology Friday May 18

DNA differences data collection

# If you were absent:

1. See slides 3 – 6 for skills-development of how to collect, record, and organize data on genetic differences that can be used to build a phylogeny
2. See slides 7 – 11 for the authentic data set (lizards of the Canary islands) for the biogeography/phylogeny investigation

Species A: AATCCGGTATCTGTACTATGGC

Species B: ...T.....C.....A.....T.....C...C..

Species C: ...T.....A.....C.....

Species D: ...TC....A....T...T...C....G..A...CA

A	A			
B	6	B		
C			C	
D				D

Use the DNA sequence data above to complete the table to the left. Record the number of DNA differences between comparisons.

Species A: AATCCGGTATCTGTACTATGGC

Species B: ...T.....C.....A.....T.....C...C..

Species C: ...T.....A.....C.....

Species D: ...TC....A....T...T...C....G..A...CA

A	A			
B	6	B		
C	3	5	C	
D	10	10	10	D

Species A: AATCCGGTATCTGTACTATGGC

Species B: ...T.....C.....A.....T.....C...C..

Species C: ...T.....A.....C.....

Species D: ...TC....A.....T...T...C....G..A...CA

A	A			
B	6	B		
C	3	5	C	
D	10	10	10	D

1. Which 2 species most recently shared a common ancestor?
2. Which species is most distantly related to the others?

Species A: AATCCGGTATCTGTACTATGGC

Species B: ...T.....C.....A.....T.....C...C..

Species C: ...T.....A.....C.....

Species D: ...TC....A.....T...T...C....G..A...CA

A	A			
B	6	B		
C	3	5	C	
D	10	10	10	D

1. Species A and C shared a common ancestor most recently because it has the least number of differences.

2. Species D is most distantly related because it has the most differences from the other (it is the basal taxon).

Use the DNA data on the next slides to complete the table (showing number of differences)

<b>1</b> <i>G. stehlini</i>	<b>1</b> <i>G. stehlini</i>						
<b>2</b> <i>G. atlantica</i>	36	<b>2</b> <i>G. atlantica</i>					
<b>3</b> <i>G. galloti</i> Palma			<b>3</b> <i>G. galloti</i> Palma				
<b>4</b> <i>G. galloti</i> N. Tenerife				<b>4</b> <i>G. galloti</i> N. Tenerife			
<b>5</b> <i>G. galloti</i> S. Tenerife					<b>5</b> <i>G. galloti</i> S. Tenerife		
<b>6</b> <i>G. galloti</i> Gomera						<b>6</b> <i>G. galloti</i> Gomera	
<b>7</b> <i>G. galloti</i> Hierro							<b>7</b> <i>G. galloti</i> Hierro

**Table 2.** Cytochrome b DNA sequence differences for populations of *Gallotia* lizards.

**Table 3.** Base-pair sequences from the mitochondrial genome for **cytochrome b** of *Gallotia* species and populations. Island codes in parentheses are P = Palma, NT = north Tenerife, ST = south Tenerife, G = gomera, and H = Hierro. Each sequence consists of four lines, eg., 1a+1b+1c+1d is the sequence for *Gallotia stehlini*.. (data from Thorpe et al., 1994).

<b>1a</b>	<i>G. stehlini</i>	-----	TCACT	TCTAG	GACTC	TGCCT	AATCA	TTCAA	ATCAT	CACAG	GCCTC	TTCCT	AGCCA	TGCAC	TACAA
<b>2a</b>	<i>G. atlantica</i>	-----	.....	.....	....T	.....	...T.	.....	.....	T....	....A	...T.	...A.	.....	.....
<b>3a</b>	<i>G. galloti</i>	(P)	-----	.....	....T	.....	...T.	.C...	.....	T....	....A	...T.	G..A.	.A...	.....
<b>4a</b>	<i>G. galloti</i>	(NT)	-----	.....	....T	.....	...T.	.....	.....	T....	....A	...T.	G..A.	.A...	.....
<b>5a</b>	<i>G. galloti</i>	(ST)	-----	.....	....T	.....	...T.	.C...	.....	T....	....A	...T.	G..A.	.....	.....
<b>6a</b>	<i>G. galloti</i>	(G)	-----	.....	....T	.....	...T.	.C...	.....	T....	....A	...T.	G..A.	.....	.....
<b>7a</b>	<i>G. galloti</i>	(H)	-----	.....	....T	.....	...T.	.C...	.....	T....	....A	...T.	G..A.	.....	.....



1b cont. CGCAG ACATT AACTC CGCAT TCTCA TCCAT TGCCC ACATC CACCG TGATG TCCAA CACGG ATGAC TCATT CGCAA  
2b cont. .... .T... ..T.. T.... .T..C ..A..  
3b cont. ....C ..... C.... ..T ..T.. ...C. .... T.... .A..C ..A..  
4b cont. ....C ..... C.... ..T ..T.. ...C. .... T.... .T... ..A..  
5b cont. ....C ..... C.... ..T .....C. .... T.... .T..C ..A..  
6b cont. ....C ..... C.... .....C. .... T..G. .T..C ..A..  
7b cont. ....C ..... C.... ..T .....C. .... T..G. .T..C ..A..

1c cont. TGTCC ACGCC AACGG CGCTT CACTA TTCTT CATCT GCATC TACGC GCATA TCGGA CGTGG CCTGT ATTAC GGCTC

2c cont. .A... .. A..C. .... ..T.. T.... .... ...AT ...C. .T... .. .C... ..

3c cont. .A... .. A..C. .... ..T.. T.... .... ...AT A..C. .T... ..G.. ..

4c cont. .A... ..T.. A..C. .... ..T.. T.... .... ...AT A..C. .T... ..A. .C... ..

5c cont. .A... ..T.. A..C. .... ..T.. T.... .... ...AT A..C. .T... ..A. .C... ..

6c cont. CA... ..T.. A..C. .... ..T.. T.... .... ...AT A..C. .T... ..G.. .T.A. ....

7c cont. CA... ..T.. A..C. .... ..T.. T.... .... ...AT A..C. .T... ..G.. TT.A. ....

1d cont. ATACC TATTT ACTGA AACCT GAAAC ATTGG AGTCC TCCTC CTTCT GCTAG TTATA GCCAC AGCCT TTATA GGCTA T  
2d cont. ....T ..... GT... ...T. .... ..C.. ...A. .T..A ..A.. T.... .C... ..... ...T. .C..G .....  
3d cont. ....T .G... ..... .....T ..... ..A. .T..T ..C.. AT... .C... ..... ...T. .C... .....  
4d cont. ....T ..... ..... .....T ..... ..A. .T..T ..C.. AT... .C... ..... ...T. .C... .....  
5d cont. ....T ..... ..... ..... ..C.. ...A. .T..T ..C.. AT... .C... ..... ...T. .C... .....  
6d cont. ...T. .... .T... ...A. ....T ..C.. ...A. .T... ..C.. A...G .C... ..... ...T. .C..G .....  
7d cont. ...T. .G... .T... ...A. ....T ..C.. G..A. .T... ..C.. A...G .C... ..... ...T. .C..G .....