

Lab 3: Genetic Diversity

Agenda

1. Genetics and Diversity
2. Lab Exercise
3. For Next Week

1.

Genetics and Diversity

- Sexually-reproducing organisms combine gametes
 - Sperm + egg
 - Two “pieces” of DNA come together for each gene



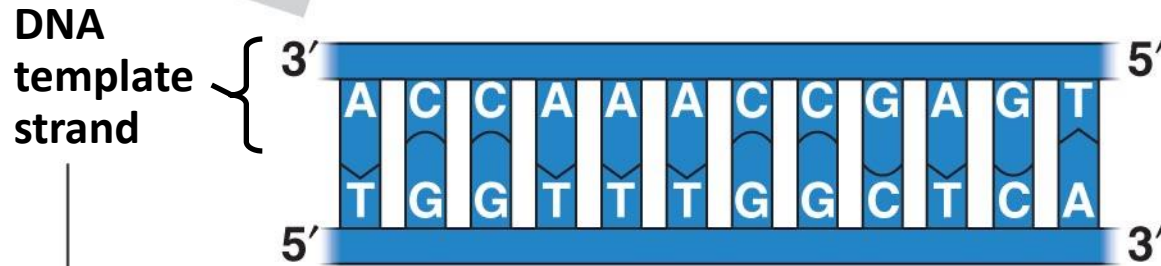
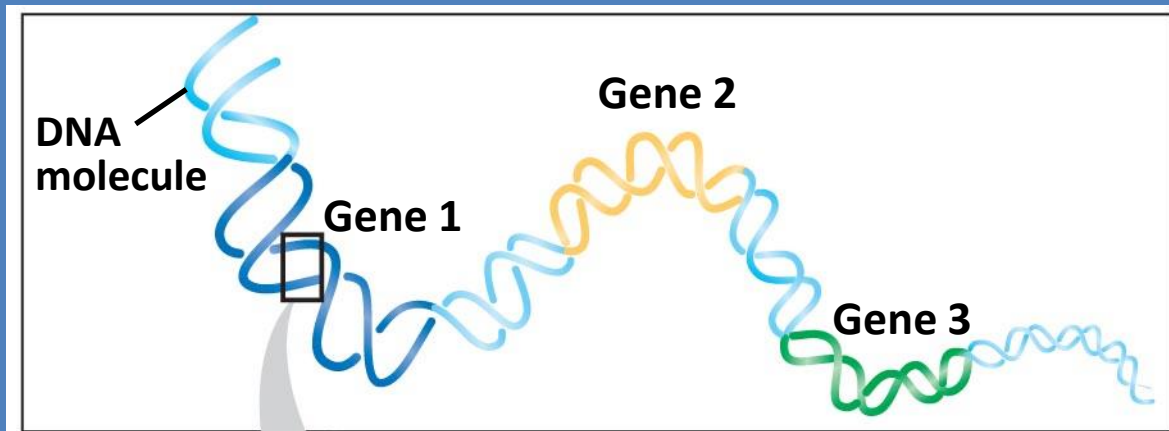
1.

Genetics and Diversity

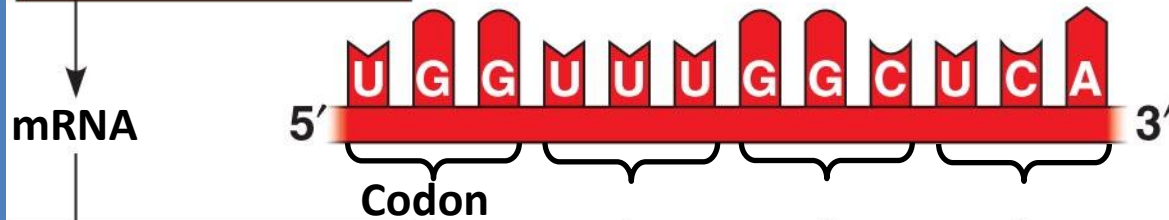
- What do the pieces of DNA do?
 - Determine our sex and characteristics
 - Produce proteins used to
 - Build our bodies
 - Conduct metabolic reactions

1.

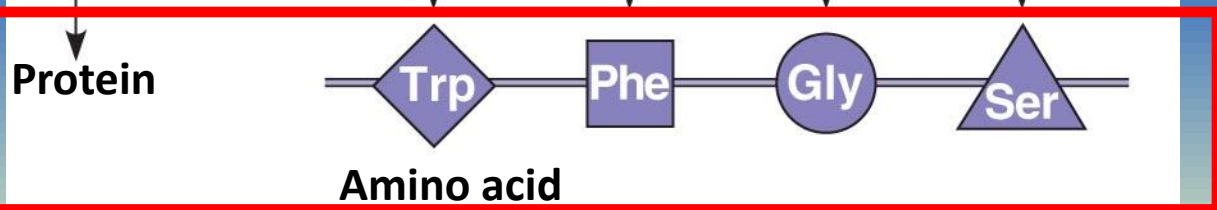
How DNA makes protein



TRANSCRIPTION



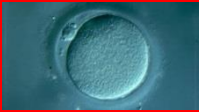



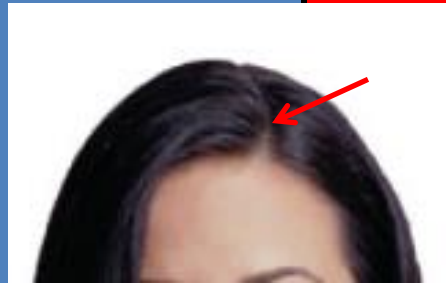
TRANSLATION



1.

Genetics and Diversity

	W 	w 
w 	Ww	ww
w 	Ww	ww



“W” DNA: makes a protein that produces a widow’s peak; requires 1
“w” DNA: makes a protein that a produces straight hairline; requires 2

1.

How about for a whole population?

The image displays 34 genotype labels scattered across the slide. These labels are combinations of the letters 'W' and 'w', representing genotypes in a population. The labels are: ww , Ww , Ww , ww , Ww , Ww , ww , ww , Ww , Ww , ww , Ww , WW , Ww , ww , Ww , Ww , ww , Ww , ww , Ww , WW , Ww , ww , Ww , WW , WW , Ww , WW , Ww , WW , ww , ww .

1.

...or multiple populations?



1.

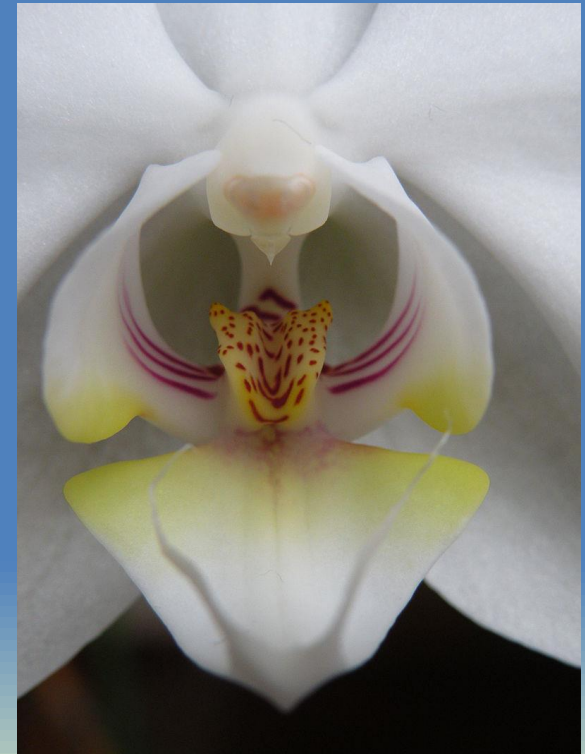
Genetics and Diversity

- Managing genetic diversity across populations involves:
 - How many “W”s are out there (p)
 - How many “w”s are out there (q)
- Collect tissue sample
- Analyze proteins produced

2.

Lab Exercise

- Two rare species of orchids
 - *Orchis isozymsus*
 - *Orchis polyzymsus*
- 2 types of DNA
 - Slow (p)
 - Fast (q)
- Use proteins produced by the different DNA sequences to look into genetic differences

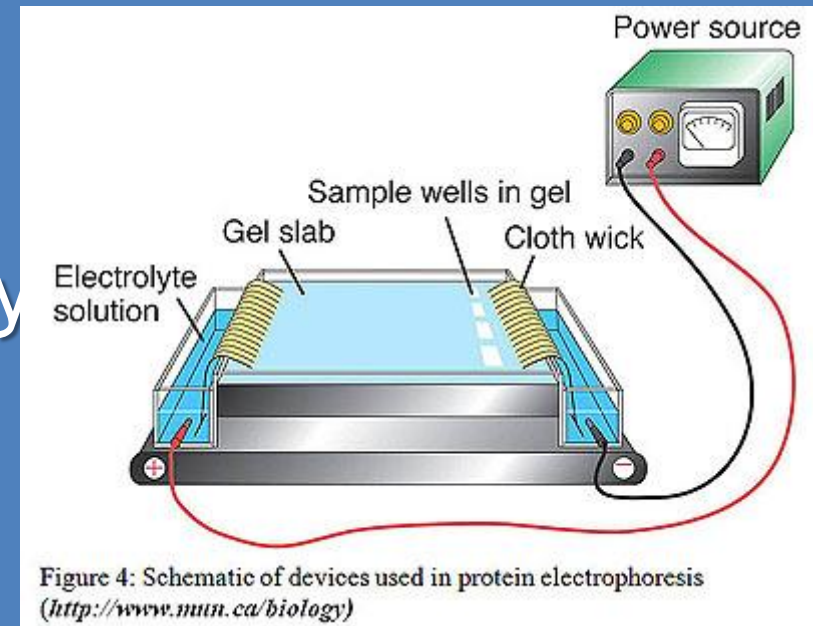


2.

Lab Exercise

- How do you analyze proteins?
 1. Place a protein sample on a gel
 2. Zap it with electricity
 3. See how quickly it moves

– Larger proteins move more slowly than smaller proteins



2. F = Piece of DNA that produces small “fast” protein
f = piece of DNA that produces large “slow” protein

Three possibilities:

FF = DNA produces only the fast protein

Ff = DNA produces fast and slow proteins

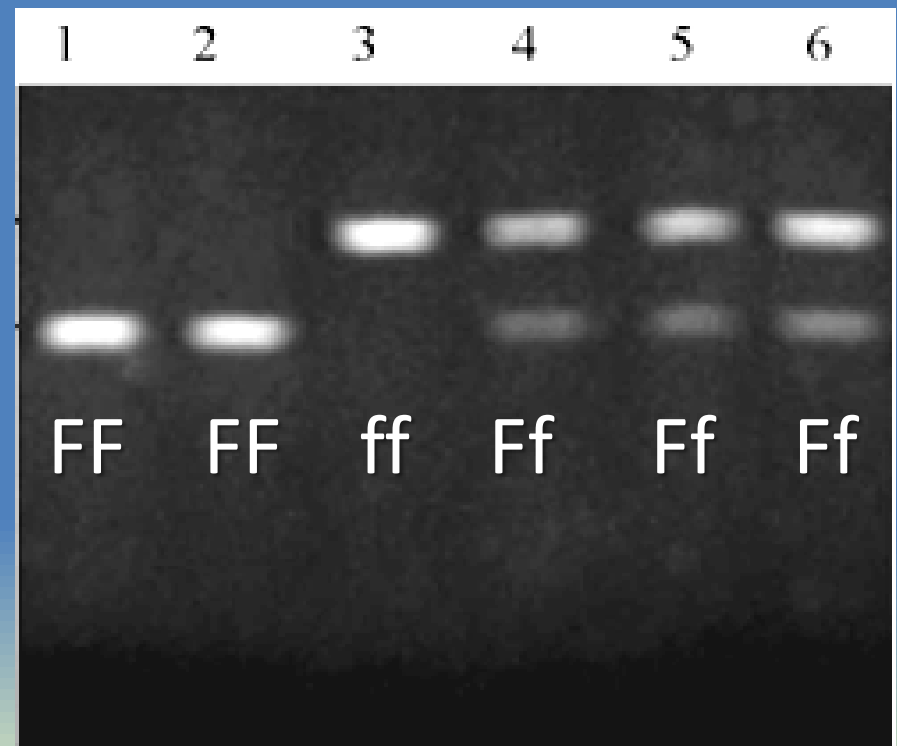
ff = DNA produces only the slow proteins

f = slow (larger) →

F = fast (smaller) →

Direction of movement

Individuals in the population



2.

Lab Exercise

- 6 wetlands
- Only enough \$ to save 4
- Determine a management plan for the two species of orchid



2.

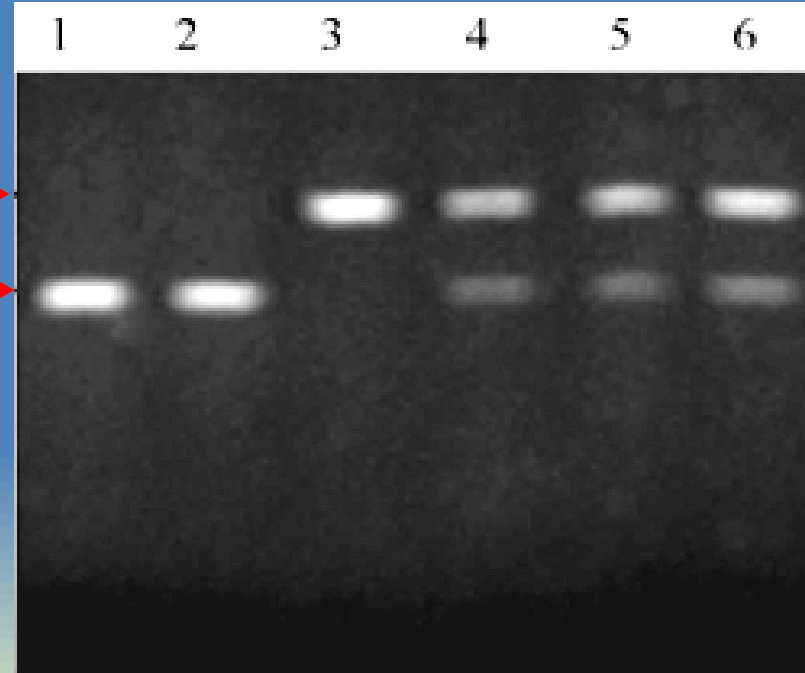
Group Quiz

1. How many individuals are in this population?
2. How many individual proteins are shown in this gel?
3. How many proteins are of the “fast” variety?
4. How many proteins are of the “slow” variety?
5. Which of the proteins is larger, fast or slow?

Direction of movement



Individuals in the population



f = slow →

F = fast →

F = Piece of DNA that produces “fast” protein
f = piece of DNA that produces “slow” protein

2.

Lab Exercise

- Using Excel:
 - Use COUNTIF equation to count numbers according to certain criteria
 - E.g., =COUNTIF(A1:A6, “=0”)

Values
1
0
2
1
0
1

3.

For Next Week

- Submit via Blackboard:
 - Orchid Data spreadsheet
 - Answer questions 1 and 4 in lab manual (p. 34)

Resources

Publications

Reece, J.B., Urry, L.A., Cain, M.L., Wasserman, S.A., Minorsky, P.V., and R.B. Jackson. 2014. Campbell Biology, 10th edition. Pearson, New York.