

Important Latin Roots					
Mono	Di	Hybrid	Pheno	Geno	Type
• 1	• 2	• Mix	• Physical	• Genetic	• form
<b>Homo</b>	Hetero	<b>Zygous</b>			
• 1	• Mix/2	Having a zygotic constitution of a specified kind			

---

---

---

---

---

---

---

---

**Appearance Vs Genes**

<p><b>Phenotype</b></p> <ul style="list-style-type: none"> <li>• Physical appearance</li> <li>– Behavior</li> </ul>	<p><b>Genotype</b></p> <ul style="list-style-type: none"> <li>• Genetic Makeup</li> </ul>
---	---

**Phenotype**

SS      Ss      ss

**Genotype**

iws.collin.edu

---

---

---

---

---

---

---

---

Offspring are not a perfect blend of the 2 parents, why?

• Dominant and Recessive Genes

---

---

---

---

---

---

---

---

### Genes and Environment Determine Characteristics



---

---

---

---

---

---

---

---

### Environmental Impact on Phenotype

**Phenotype = Genotype + Environment**

Crop Yield = Genotype

- + Minerals
- + Water
- + Light
- Pests
- etc.

Optimizing these factors determines agricultural productivity...last unit!

Human Skin Color = Genotype

+ Sun (UV) Exposure

- Aging Factors

The sun exposure effect is most obvious in people of intermediate skin base color  
but everyone can have "tan lines"

---

---

---

---

---

---

---

---

### Environmental Impact on Phenotype



pH of the soil will change the color of hydrangea flowers from blue to pink

---

---

---

---

---

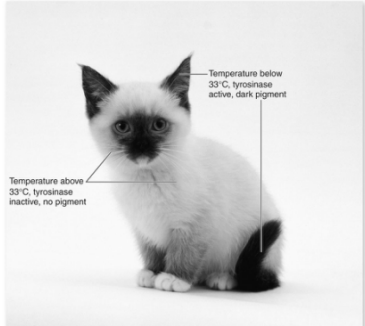
---

---

---

### Environmental Impact on Phenotype

Copyright © The McGraw-Hill Companies, Inc. Permission required for reproduction or display.



---

---

---

---

---

---

---

---

### Mendel's Pea Plant Experiments



---

---

---

---

---

---

---

---

### Types of Genetic Crosses

- **Monohybrid cross - cross involving a single trait**  
e.g. flower color
- **Dihybrid cross - cross involving two traits**  
e.g. flower color & plant height
  - This is Far More common, lots of genes work together to form simple traits like eye or hair color

---

---

---

---

---

---

---

---

### Genetic Terminology

**Genotype:** total set of alleles of an individual (e.g. RR, Rr, rr)

PP = homozygous dominant

Pp = heterozygous

pp = homozygous recessive

**Phenotype:** the physical feature resulting from a genotype (e.g. red, white)

---

---

---

---

---

---

---

---

### Punnett process

- Here we have some more interesting results: First we now have 3 genotypes

– (TT, Tt, & tt) in a 1:2:1 **genotypic ratio**.

- We now have 2 different phenotypes

– (Tall & short) in a 3:1 **Phenotypic ratio**. This is the common outcome from such crosses.

	T	t
T	TT	Tt
t	Tt	tt

---

---

---

---

---

---

---

---

### Breed the P<sub>1</sub> generation

- tall (TT) x dwarf (tt) pea plants

	T	T
t		
t		

---

---

---

---

---

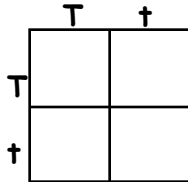
---

---

---

### Breed the F<sub>1</sub> generation

- tall (Tt) vs. tall (Tt) pea plants




---

---

---

---

---

---


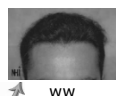
---

---

**Alleles** (Versions of Gene) W - Widow's  
w - Straight

**Classic Dominance**  
 Example : Widow's Peak Trait

**Mom** **Dad**






ww      ww

	W	W
W		
w		

All Children: ww  
= Straight Hairline

**Mom** **Dad**

Ww      WW

	W	W
W		
w		

All Children: Ww or WW  
= Widow's Peak

Adapted from B. McGraw

---

---

---

---

---


---

---

---

#### 5. Sex-Linked Genes


**Male**



44 + XY  
Somatic cells


22 + X  
Sperm

**Female**




44 + XX  
Somatic cells

22 + X  
Egg



44 + XX  
Offspring  
Female



44 + XY  
Offspring  
Male

© 2010 Pearson Education, Inc.

---

---

---

---

---

---

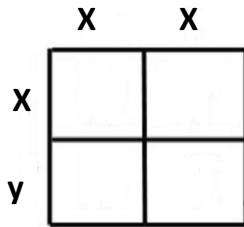
---

---

**Who decides the babies sex?**

Mom can give X

Dad can give X or y



Dads determine sex of babies.

If dad gives X with mom's X = girl

If dad give y with mom's X = boy district.goshenschools.org

---

---

---

---

---

---

---

---

**SEX CHROMOSOMES CAN CARRY OTHER GENES TOO = SEX LINKED TRAITS**

district.goshenschools.org

---

---

---

---

---

---

---

---

**Sex chromosomes can carry other genes**

**Y-LINKED GENES:**

Genes carried on Y chromosome



**EX:**  
Hairy pinna

Y linked genes only show up in males.

district.goshenschools.org

---

---

---

---

---

---

---

---

**Make a cross with a y-linked gene**

	X	X	
X			ALL GIRLS = _____  ALL BOYS = _____
$y^H$			

district.goshenschools.org

---

---

---

---

---

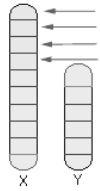
---

---

---

**Sex chromosomes can carry other genes**

**X-LINKED GENES:**  
Genes carried on the X chromosome



EX: Hemophilia  
Colorblindness  
Duchenne Muscular Dystrophy

district.goshenschools.org

---

---

---

---

---

---

---

---

**Color blindness is sex linked**

	$X^b$	y	Parents: • <b>HOMOZYGOUS Normal Mom</b> <span style="margin-left: 40px;">X</span> • <b>Colorblind dad</b>  GIRLS = _____ BOYS = _____
$X^B$			
$X^B$			

district.goshenschools.org

---

---

---

---

---

---

---

---

### Calico Cat

Calico is a coat color found in cats, which is caused by a **SEX-LINKED, CODOMINANT** allele.


**B = Black**  
**R = oRange**  
**BR = calico**

The following genotypes are possible;

female cats can be black  $X^B X^B$ , orange  $X^R X^R$ , or calico  $X^B X^R$   
 male cats can be black  $X^B Y$  or orange  $X^R Y$

Can there be calico male?

Yes, But very rare



**XXY male**

[http://www.biology.com/worksheets/gene/ics\\_calico.html](http://www.biology.com/worksheets/gene/ics_calico.html)

---

---

---

---

---

---

---

---

---

---

**Y linked genes \_\_\_\_\_ show up in males.**

**X linked recessive genes appear \_\_\_\_\_ in males than females.**

**Females can be \_\_\_\_\_ for X linked recessive traits.**

**Males can \_\_\_\_\_ carriers for X linked recessive genes. The either have trait OR are normal.**

district.goshenschools.org

---

---

---

---

---

---







---

---

---

---

Figure 9.12

DOMINANT TRAITS	 Freckles	 Widow's peak	 Free earlobe
RECESSIVE TRAITS	 No freckles	 Straight hairline	 Attached earlobe

© 2013 Pearson Education, Inc.

---

---

---

---

---

---

---

---

---

---