Genetics – Mendelian Exceptions Multiple Alleles and Sex-linked Genes

Chapter 14 Section 2

Objectives: Students will
A) Identify the genotypes of males compared to females
B) Define sex-linked traits
C) Complete punnett squares for sex-linked traits
D) Predict offspring outcomes of multiple allele crosses
E) Read and predict genetic outcomes from pedigrees

Obj. B) Define sex-linked traits
1. X- Linked inheritance

Certain sex-linked genes are _____ chromosomes and their alleles are _____chromosomes.

These genes are called _____

Their mode of inheritance is called _____ _____

This pertains to the inheritance of traits which are controlled by genes located in the non-homologous part of _____

Examples:

A) Identify the genotypes of males compared to females.

Human males are the _____sex with two different_____ _____.
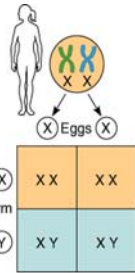
Human females are the_____

During fertilization, what is the probability that a female will result?

Obj. C) Complete punnett squares for sex-linked traits

X^BX^B - Normal female

X^BX^b - Carrier female

X^bX^b - Affected female

X^BY - Normal Male

X^bY - Affected male

Obj. B) Define sex-linked traits

Chromosomes carry _____. Genes are located on_____.

Genes on

Autosomes – _____

Sex chromsomes- _____

However, certain genes present in the sex chromosomes_____.

The characters which are controlled by such genes are called _____and transmission of such traits from one generation to next is called_____
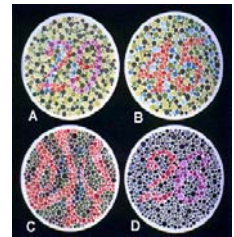
Sex-linked Recessive Practice

Obj. C) Complete punnett squares for sex-linked traits

Trait: Color blindness
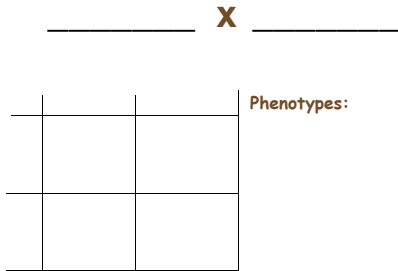
Cross: Carrier female x Color Blind male

_____   X   _____
Use genotypes on previous slide.

Phenotypes (Use ID names on previous slide):
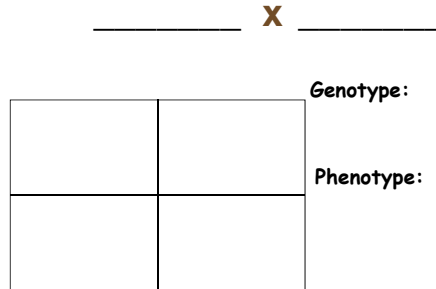
Sex-linked Recessive Example
Trait: Color blindness
Cross: Carrier female x Normal male

Obj. C) Complete punnett squares for sex-linked traits

_____ X _____

Phenotypes:

Obj. D) Predict offspring outcomes of multiple allele crosses

Example: homozygous male Type B ($I^B I^B$)
x
heterozygous female Type A ($I^A i$)

_____ X _____

Genotype:

Phenotype:

Obj. B) Define sex-linked traits

See page 345 for a list

X – Linked Recessive:
1. Affects _____ more than _____

2. _____of an affected male are affected, the trait _____in pedigrees.
   Exception to this pattern occurs in the rare instance when the _____ mates with a female _____, producing an affected _____ offspring.

X – Linked Dominant:
1. Affected _____ produces all affected _____ offspring and no affected _____ offspring
2. Approximately _____ the offspring of affected females are affected, regardless of their sex.

Obj. D) Predict offspring outcomes of multiple allele crosses

Practice: male Type O
x
female type AB

_____ X _____

Genotype:
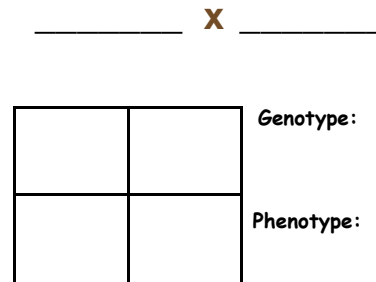
Phenotype:

Obj. D) Predict offspring outcomes of multiple allele crosses
Multiple Alleles – Blood type

Phenotype (blood type)	Genotype	Antigen Type	Antibodies made by body	Safe to Transfuse to	Safe to Transfuse From
A	$I^A I^A$ or $I^A i$	A	B	A, AB	A, O
B	$I^B I^B$ Or $I^B i$	B	A	B, AB	B, O
AB	$I^A I^B$	A and B	None	AB	A, B, AB, O
O	ii	None	A and B	A, B, AB, O	O

Obj. E) Read and predict genetic outcomes from pedigrees

Always read the legend

Square = Male
Circle = Female
Shaded = color blind
No shade = normal vision
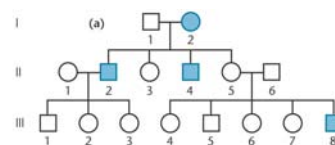
1. What does a line between a male and female indicate?
2. What do the circles and squares beneath this mean?
3. What are the genotypes of the following individuals:
A. Individual #8, Generation III
B. Individual #3, Generation II
C. Individual #2, Generation III

Understanding Check – Sex-linked

This disease appeared as a mutant in Queen Victoria and from her it was transmitted to her descendants.

"Royal disease" = Hemophilia, Bleeder's Disease
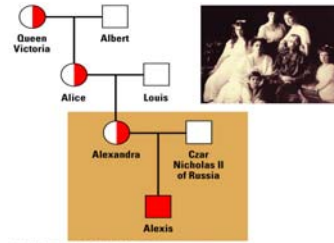
$X^H X^H$ - Normal female
$X^H X^h$ - Carrier female
$X^H Y$ - Normal Male
$X^h Y$ - Affected male
$X^h X^h$ - Affected female

_____ X _____

Cross a carrier female with a normal male. Identify the phenotypes.

Understanding Check – Multiple Alleles

Cross a heterozygous type B blood type with a AB blood type

_____ X _____

Phenotype Percentages: