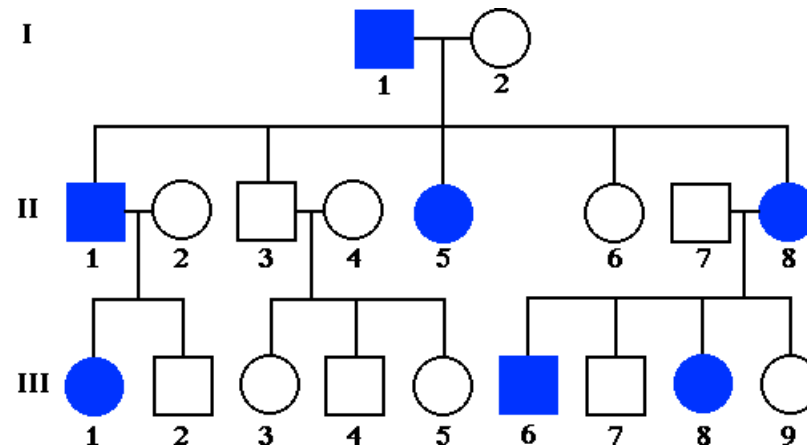
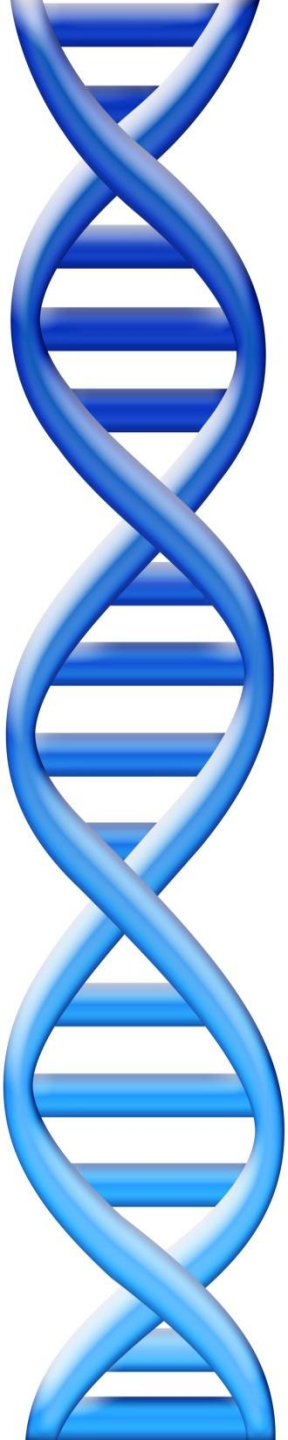


Human Inheritance Patterns

Honors Biology
Facilitator- Mr. Lee
Room 320



Pedigree 1. An idealized pedigree of a family with hypercholesterolemia, an autosomal dominant disease where the heterozygote has a reduced number of functional low density lipoprotein receptors.



Objectives

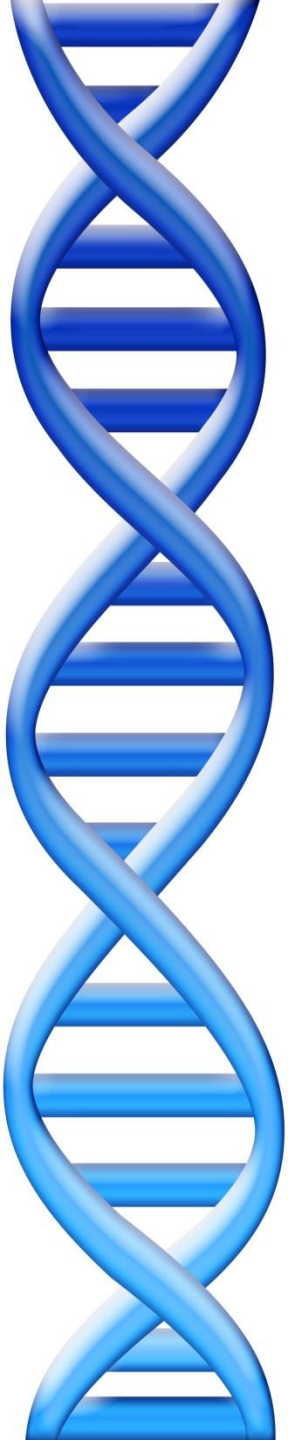
- ▶ **Explain the role of sex chromosomes in sex determination**
- ▶ **Describe how sex linkage affects the inheritance of traits**
- ▶ **Explain the inheritance of ABO blood groups**
- ▶ **Show how pedigree analysis can be used to illustrate the inheritance of traits**



Sex Determination

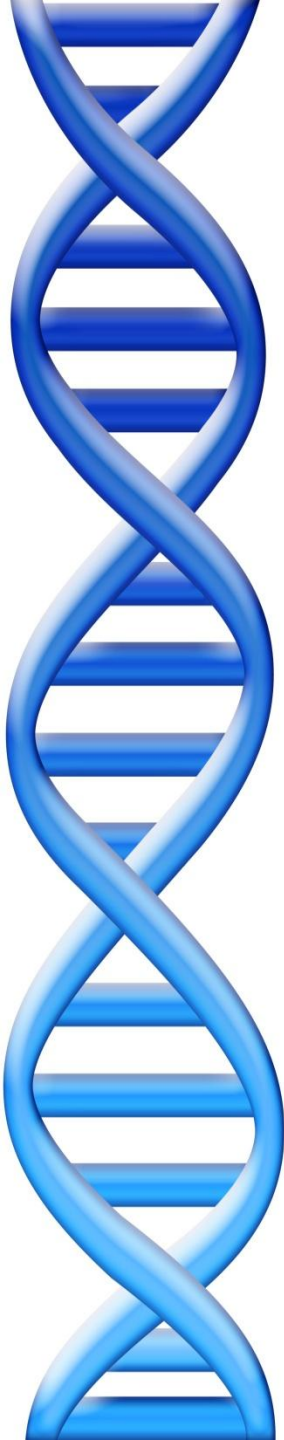
- ▶ In mammals and most insects:
 - ▶ Males have one X chromosome and one Y chromosome (XY)
 - ▶ Females have two X chromosomes (XX)
- ▶ Gametes produced by males can be X or Y, while gametes produced by females are always X

	X	X	
X	XX	XX	50% girl
Y	XY	XY	50% boy



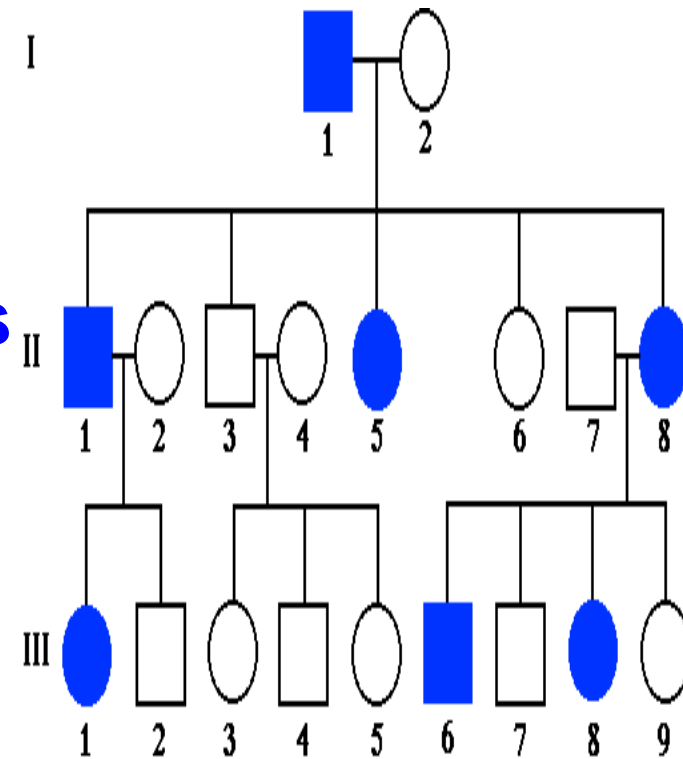
Sex Linkage

- ▶ The presence of a gene on a sex chromosome is called a sex linkage
- ▶ Genes found on the X chromosome are called X-linked genes
- ▶ Genes found on the Y chromosome are called Y-linked chromosomes



Pedigree Analysis

- ▶ A pedigree is a record that shows how a trait is inherited over several generations
- ▶ Squares represent males
- ▶ Circles represent females
- ▶ Generally, colored in squares or circles indicates that person has the trait you are monitoring

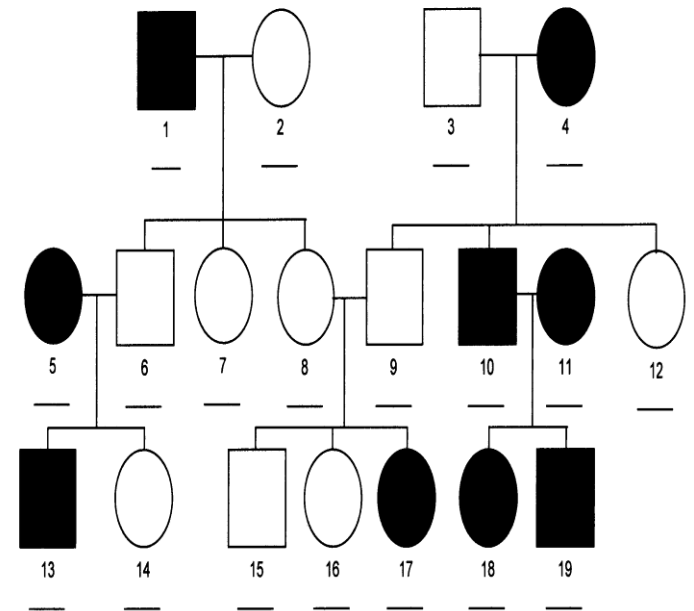


Pedigree 1. An idealized pedigree of a family with hypercholesterolemia, an autosomal dominant disease where the heterozygote has a reduced number of functional low density lipoprotein receptors.

Autosomal Recessive Pedigree

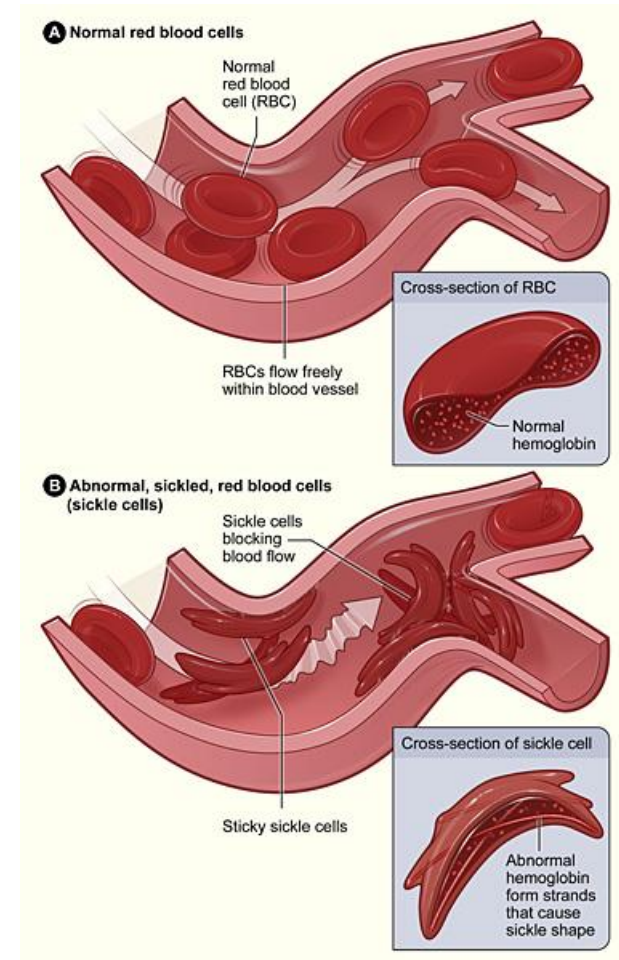
- ▶ This pedigree shows a trait that is inherited as a autosomal recessive trait
- ▶ We know it is autosomal because both sexes can have the trait
- ▶ A person can:
 - ▶ Not be effected
 - ▶ Display the trait
 - ▶ Be a carrier

AUTOSOMAL
RECESSIVE



Traits Controlled by a Single Allele

- ▶ **Single-allele traits are controlled by a single allele of a gene**
- ▶ **Huntington's disease (HD) is caused by a dominant allele located on an autosome**
- ▶ **Cystic fibrosis (CF) and sickle cell anemia are controlled by homozygous recessive alleles**



Traits Controlled by Multiple Alleles

These are traits controlled by three or more alleles

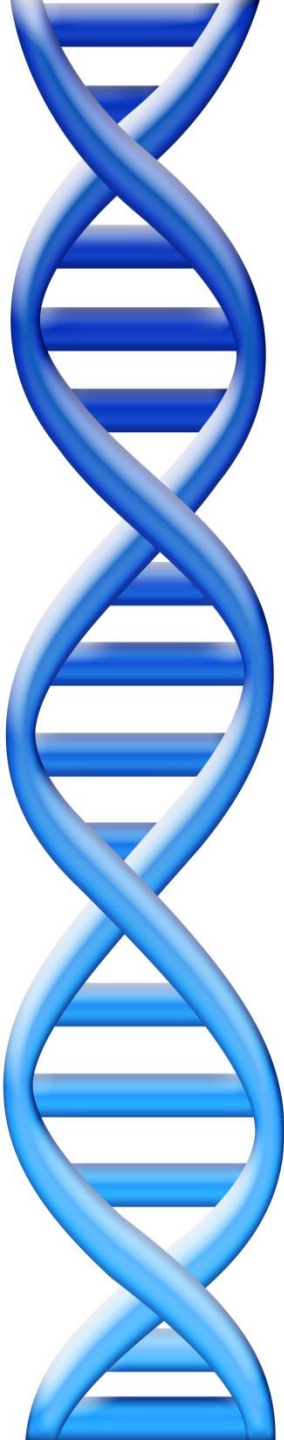
The human ABO blood groups are controlled by three alleles

▶ I^A , I^B , and i

		Mother	
		i	i
Father	I^A	$I^A i$	$I^A i$
	I^B	$I^B i$	$I^B i$

Half of the children predicted to be Type A, and half Type B.

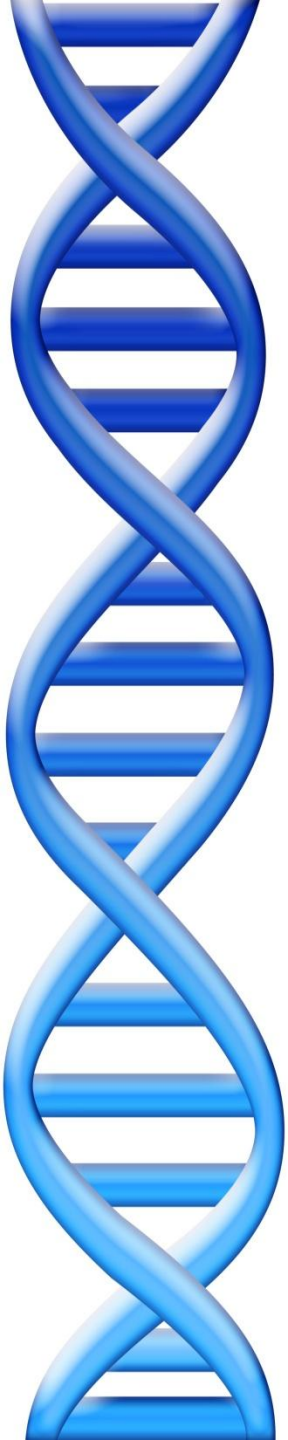
Blood Type	Genotype		Can Receive Blood From:
A	$i^A i$ $i^A i^A$	AA AO	A or O
B	$i^B i$ $i^B i^B$	BB BO	B or O
AB	$i^A i^B$	AB	A, B, AB, O
O	ii	oo	O



Polygenic Traits

- ▶ **Traits that are controlled by two or more genes are called polygenic traits**
- ▶ **Example would be skin color in humans (believed three to six different genes control this trait)**





X-Linked Traits

- ▶ **Color blindness is a recessive X-linked disorder**
- ▶ **Hemophilia is another recessive X-linked trait that occurs almost exclusively in males**



Sex-Influenced Traits

- ▶ **In sex-influenced traits, males and females have different phenotypes, even when they share the same genotype**
 - ▶ **The presence of male or female hormones influence the expressions of certain human traits**
- ▶ **Baldness is an example (higher levels of testosterone influence)**





Review

Explain the role of sex chromosomes in sex determination

- ▶ **Males have one X chromosome and one Y chromosome (XY)**
- ▶ **Females have two X chromosomes (XX)**
- ▶ **Gametes produced by males can be X or Y, while gametes produced by females are always X**

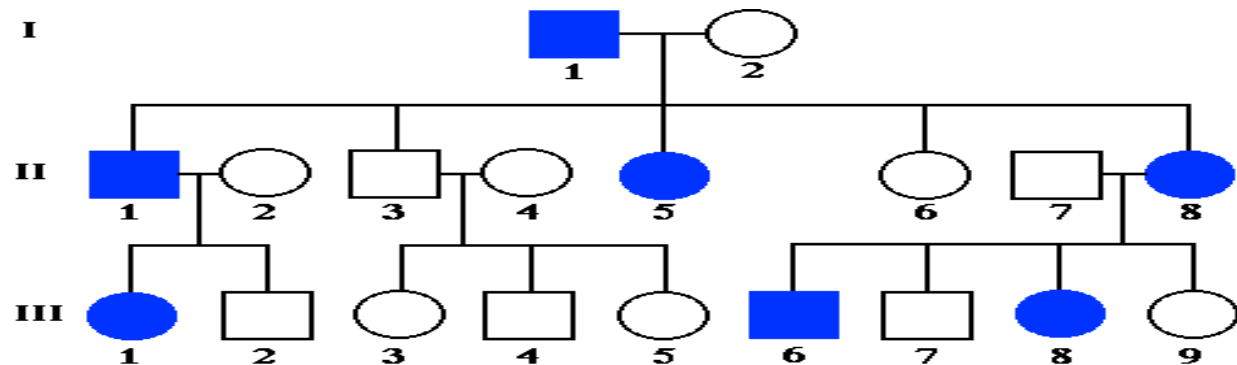


Review...

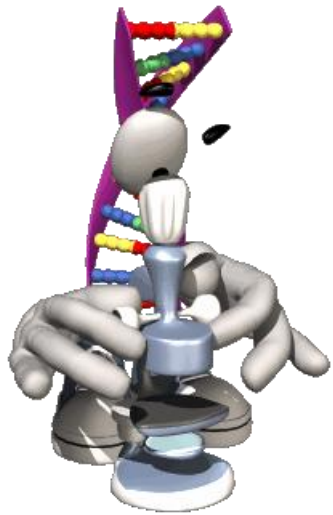
- ▶ **Describe how sex linkage affects the inheritance of traits**
 - ▶ **The presence of a gene on a sex chromosome is called a sex linkage**
 - ▶ **Genes found on the X chromosome are called X-linked genes**
 - ▶ **Genes found on the Y chromosome are called Y-linked chromosomes**

Review...

- ▶ Explain the inheritance of ABO blood groups
 - ▶ The human ABO blood groups are controlled by three alleles
 - ▶ I^A , I^B , and i
- ▶ Show how pedigree analysis can be used to illustrate the inheritance of traits



Pedigree 1. An idealized pedigree of a family with hypercholesterolemia, an autosomal dominant disease where the heterozygote has a reduced number of functional low density lipoprotein receptors.



Learn Long
Live Long

