

# HUMAN CHROMOSOMES

Chapter 14-2

This litter of kittens has one calico. This kitten is most definitely a female.

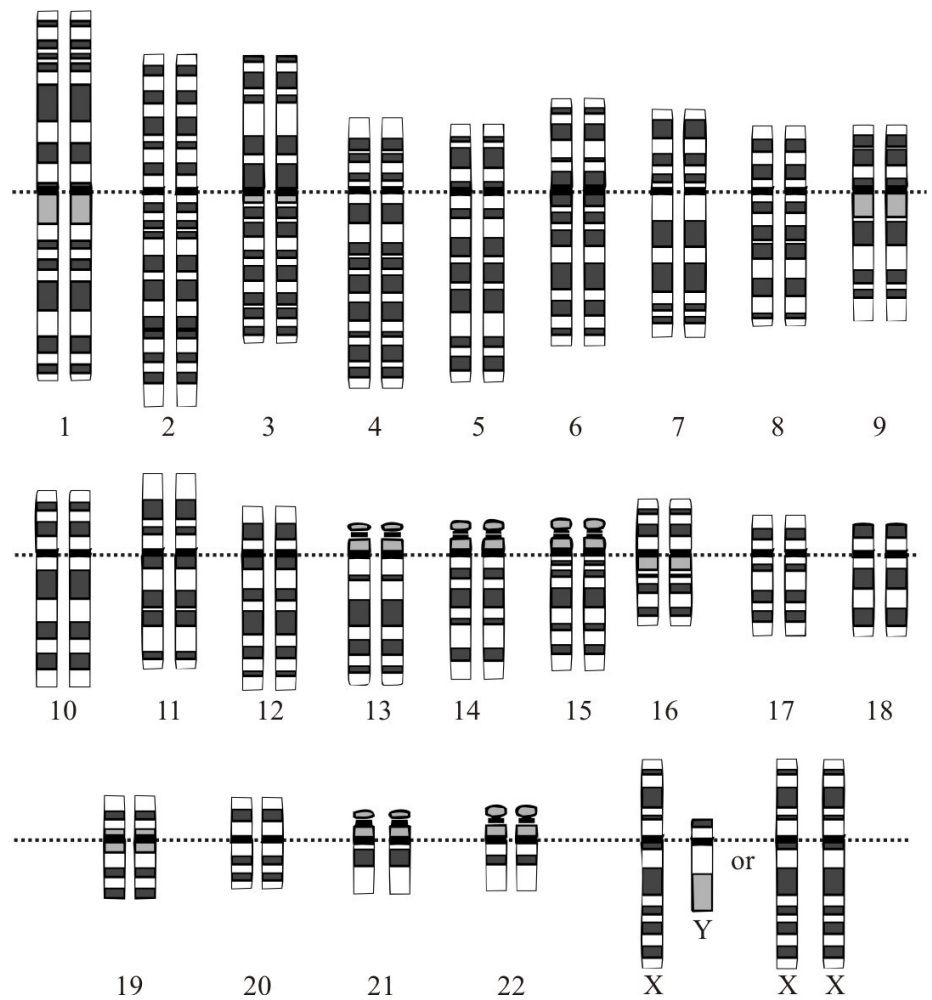
Genetic patterns of coat color in cats can help you understand why that is.



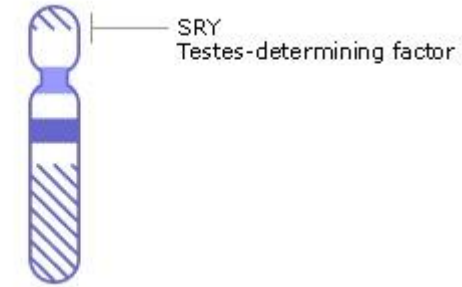
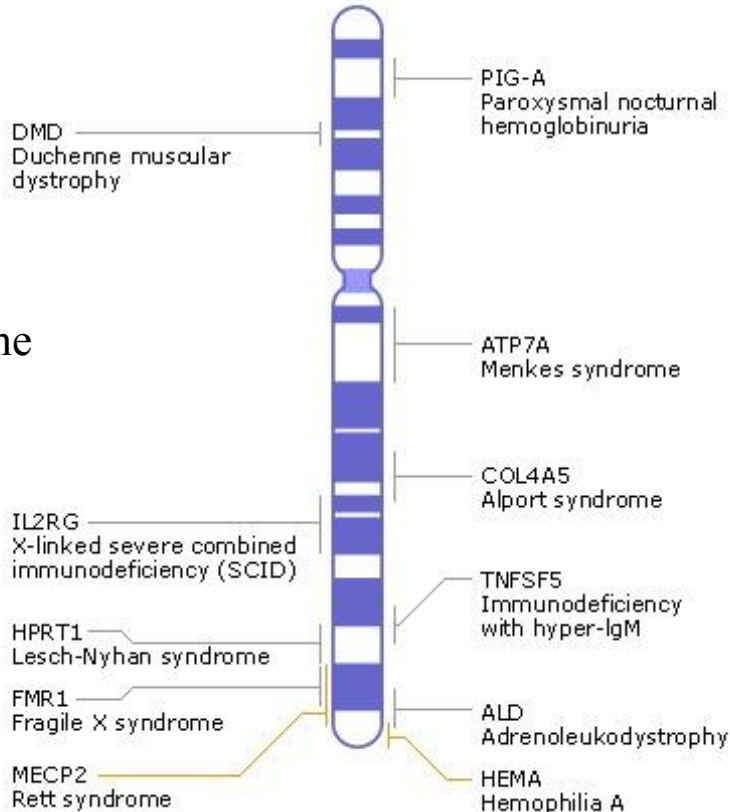
Genes are located on chromosomes.

Some genes are located on the **SEX CHROMOSOMES** ( X and Y)

These are called **SEX-LINKED GENES**



# Comparing X and Y chromosome



Y Chromosome

X Chromosome

# How coat color is inherited in cats

$X^B X^B$  = black, female

$X^R X^R$  = oRange, female

$X^B X^R$  = calico, female

$X^B Y$  = black, male

$X^R Y$  = orange, male

**REMEMBER: THE  
Y IS WIMPY!** No  
letters (genes) are  
attached to it.



# CROSSES

$X^B X^B$  (black female)

$X^R Y$  (orange male)

This explains why all calico cats are female!



**X-inactivation** is a process by which one of the copies of the X chromosome is inactivated.

- prevents females from having twice as many X chromosome gene products as males
- The choice of which X chromosome will be inactivated is random.

*December 22, 2001, scientists at Texas A&M University announced the birth of CC, the world's first cloned cat. CC, as in Copy Cat, has the same DNA blueprint as her genetic mother. Why don't they look alike?*



# COLORBLINDNESS IS ALSO SEX LINKED

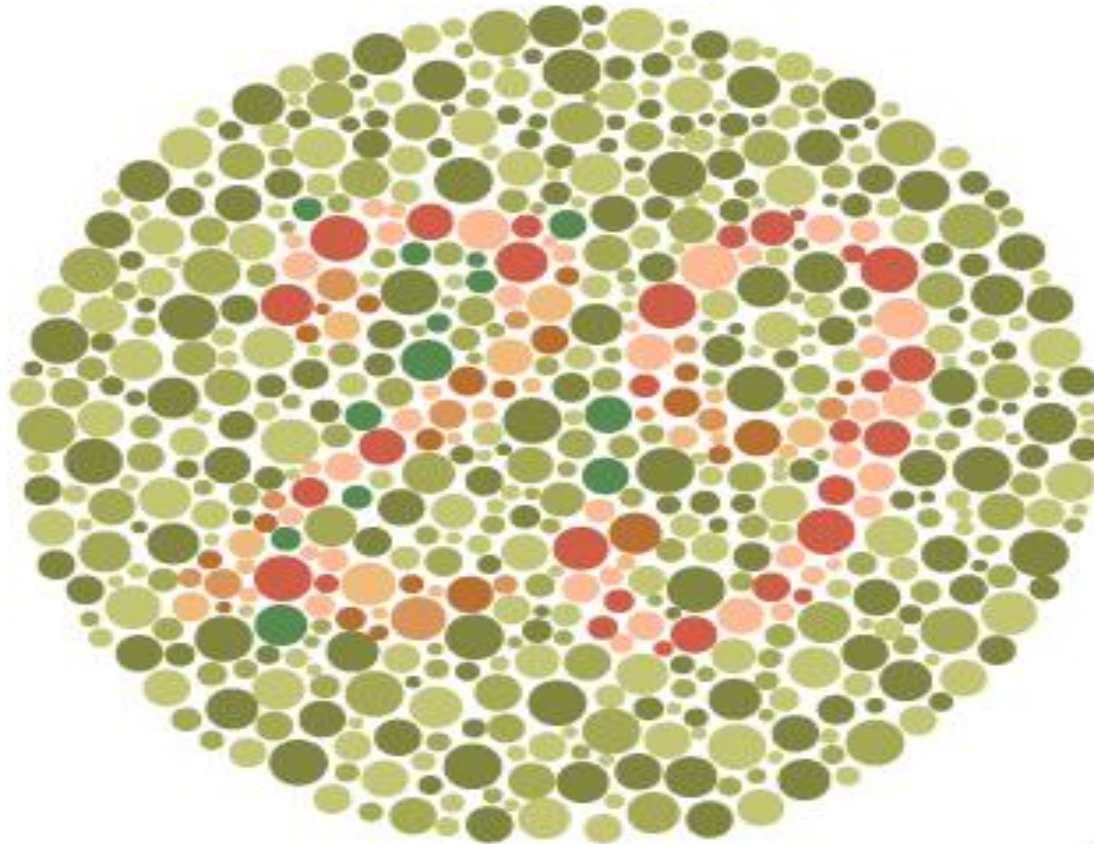
Look what happens when a woman who is a CARRIER (b) marries a normal man (B)



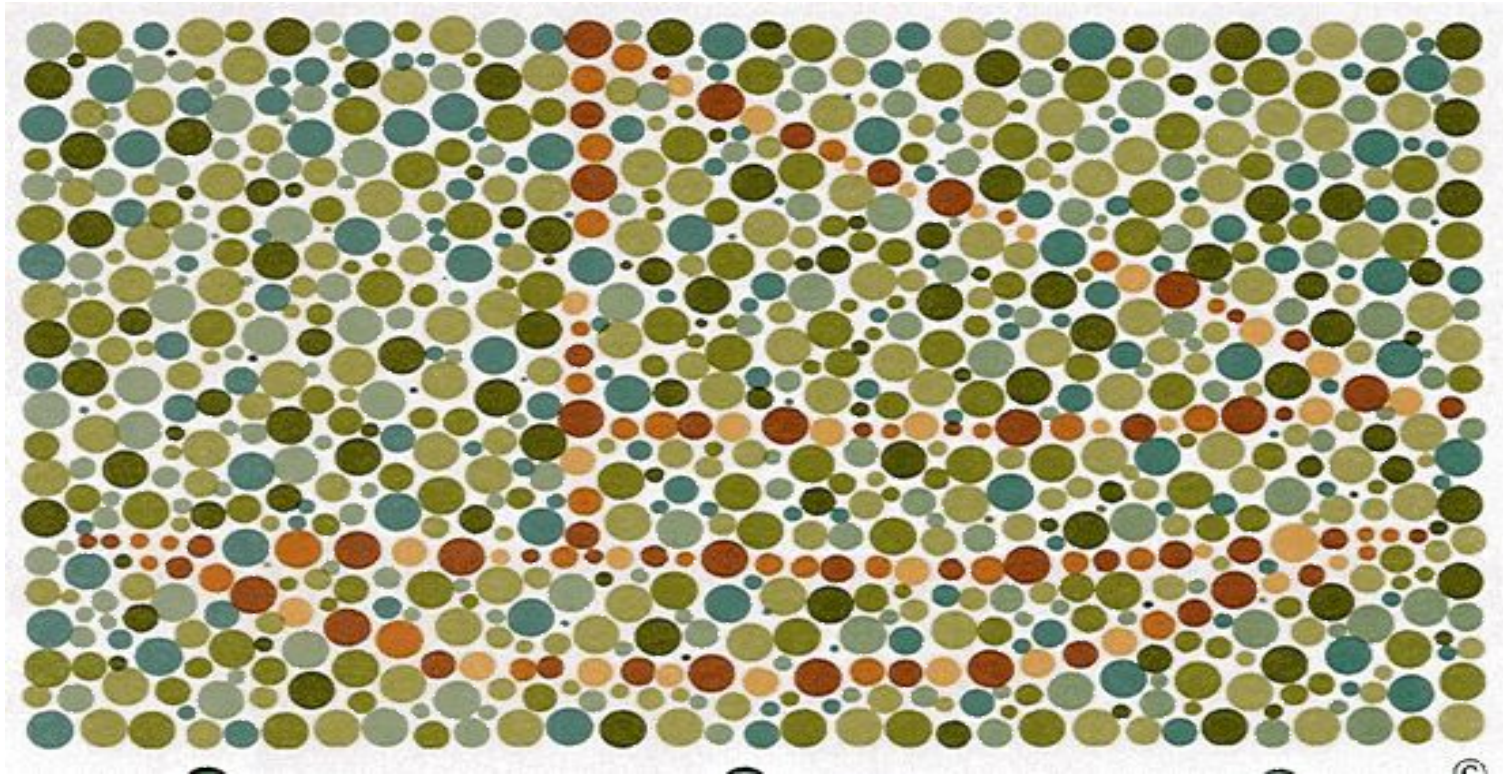
What happens when a colorblind man marries a normal woman?



# COLORBLIND TEST







Young children are given pictures  
instead of numbers

# HEMOPHILIA - "bleeder's disease"

Blood will not clot normally, small injuries can be life threatening

## Females

$X^H X^H$  = normal

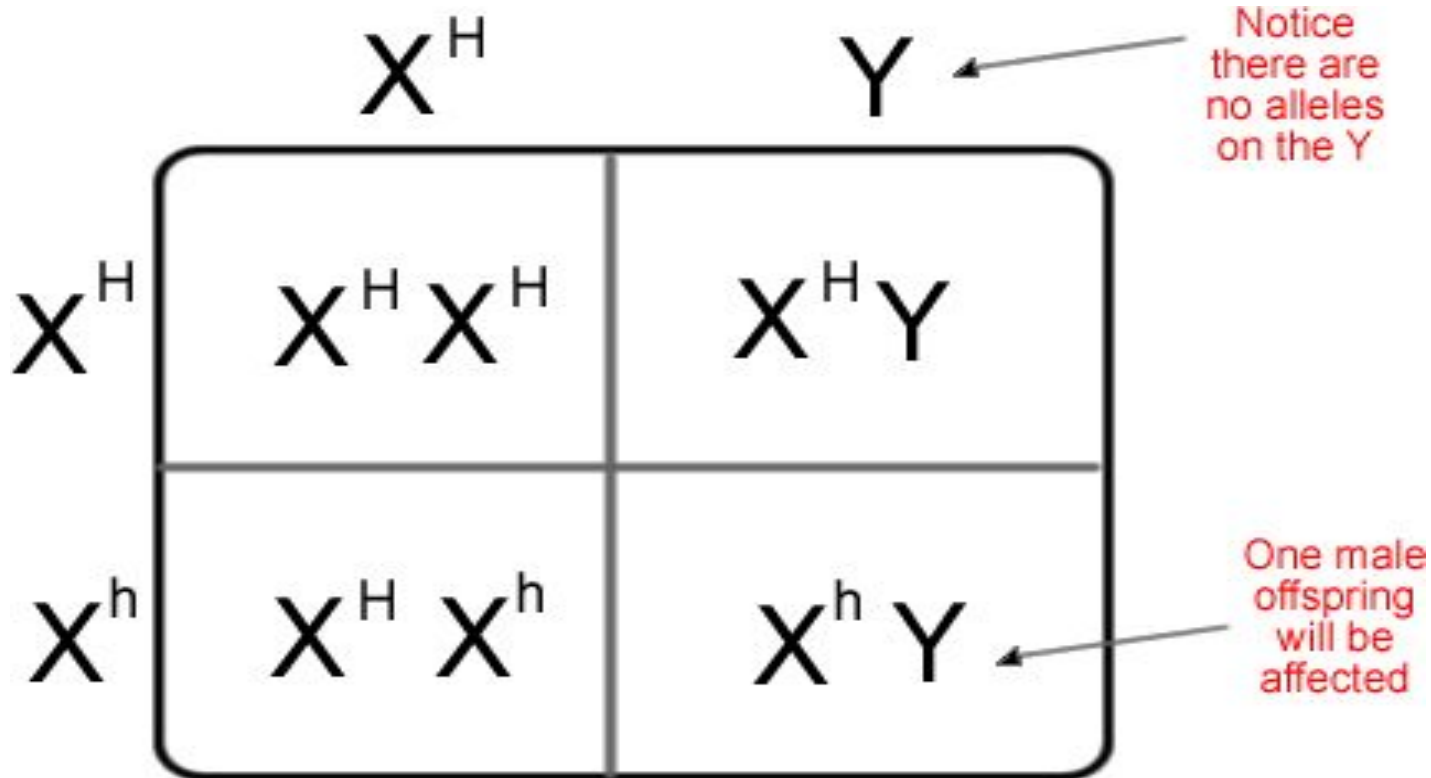
$X^H X^h$  = normal (carrier)

$X^h X^h$  = hemophilia

## Males

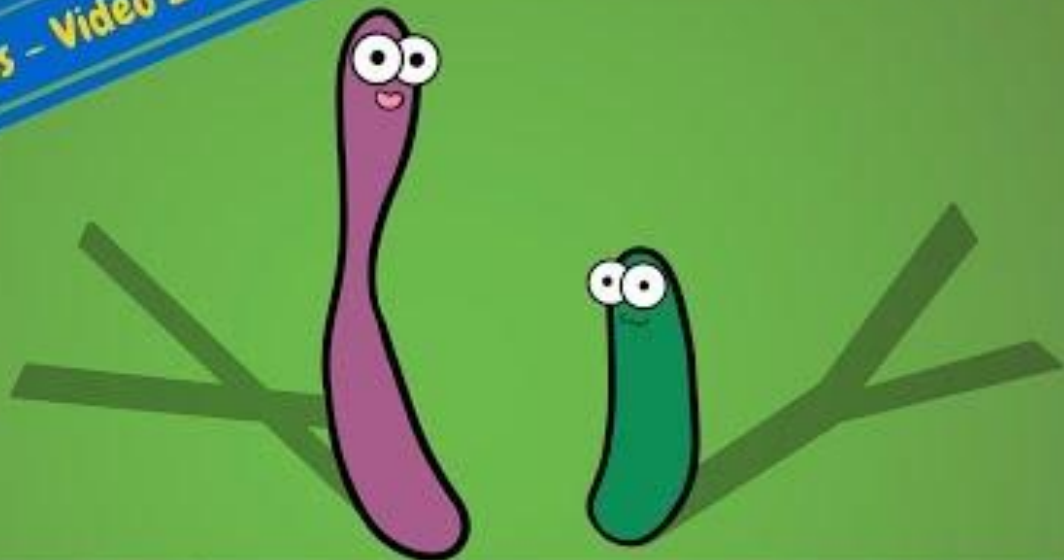
$X^H Y$  = normal

$X^h Y$  = hemophilia



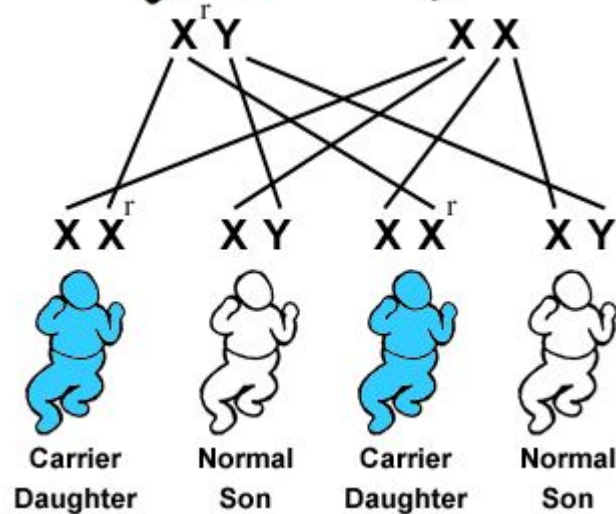
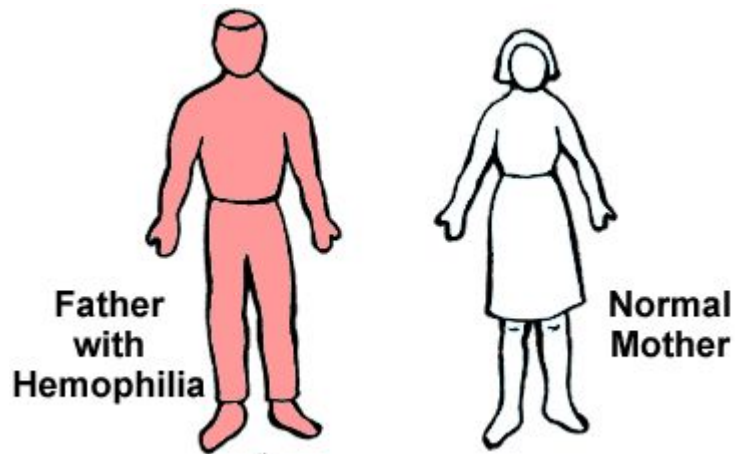
What happens if Mom is a carrier?

Genetic Series - Video 2



## Sex-Linked Traits

with the Amoeba Sisters



Practice:

What would happen if a normal woman marries a man with hemophilia?

# DUCHENNE MUSCULAR DYSTROPHY

- causes progressive weakening and loss of muscle tissue

Females can be carriers:



# Rett Syndrome

A neurological disorder that causes severe impairment, inability to speak, walk, repetitive movements, seizures.

It affects only girls, and is caused by a mutation on the X chromosome.

Why are there no boys with Rett syndrome?



