INHERITED GENETIC DISORDERS

* Inherited disorders are caused by a gene passed from parent to child.

* Inherited disorders can be:
  - Dominant
  - Recessive
  - X-linked

DOMINANT DISORDERS:

* If one parent has the dominant gene disorder, there is a 50% chance that it will be passed to each child

Example

- Let's say one parent has the disorder (Dd) and the other does not (dd)

Example

- Let's say one parent has the disorder (Dd) and the other does not (dd)

	D	d
d	Dd	dd
d	Dd	dd

Example

- Let's say one parent has the disorder (Dd) and the other does not (dd)

50% of the offspring would be affected. (Dd)

	D	d
d	Dd	dd
d	Dd	dd

DOMINANT DISORDERS:

* Huntington's disease:
  * An inherited nerve disorder that causes loss of control of movements and mental function, usually starts around 35-50 years old.

DOMINANT DISORDERS:

* Polydactyly:
    * Extra fingers or toes.

RECESSIVE DISORDERS:

* Both parents must carry the gene for the disorder
* If you have a recessive gene for a disorder, you are a CARRIER
* You may show no symptoms but you can still pass it on to your children

RECESSIVE DISORDERS:

* If both parents carry the recessive gene:
* 25% chance that a child they have will have disorder
* 50% chance that their child will be a carrier
* 25% chance that a child will not get the gene at all

Example

- Let's say both parents are carriers Dd Dd

Example

	D	d
D	DD	Dd
d	Dd	dd

Example

50% would be carriers (Dd).

25% would be affected (dd).

25% would not be affected. (DD)

	D	d
D	DD	Dd
d	Dd	dd

RECESSIVE DISORDERS:

* Sickle Cell Disease
  * Red blood cells have crescent shape
  * Causes anemia and pain, most often in African Americans

RECESSIVE DISORDERS:

* Tay-Sachs Disease:
* Causes mental retardation, blindness, seizures, and death usually by age 5
* Most often seen in people of eastern European Jewish descent, French Canadians, and Cajuns

RECESSIVE DISORDERS:

* Cystic Fibrosis:
* Causes problems in digestion and breathing
* Occurs mostly in people of Northern European descent

X-LINKED/SEX LINKED DISORDERS:

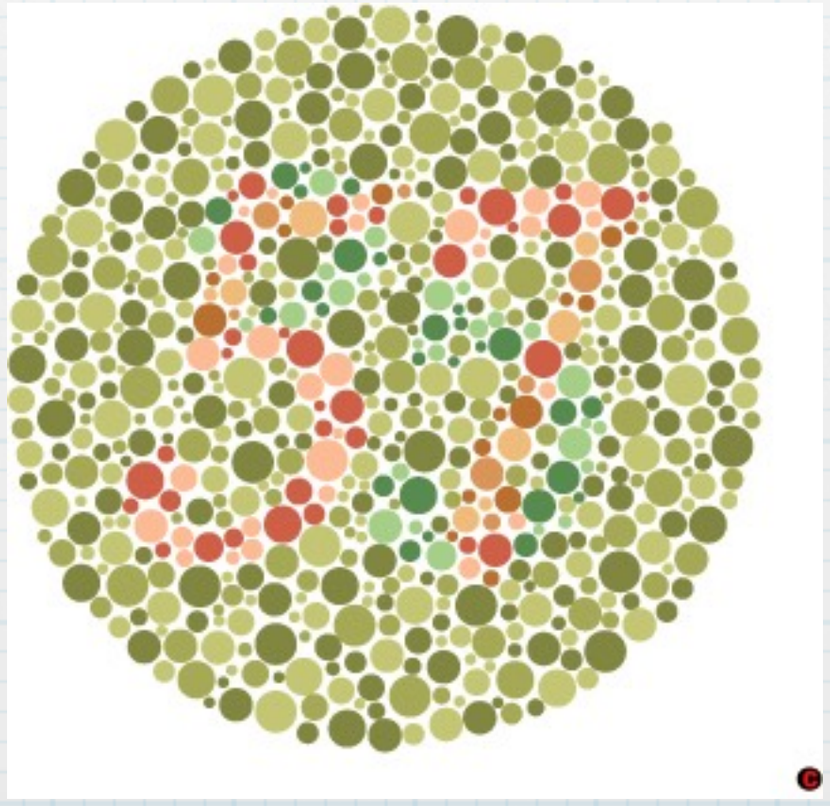
* Disorders caused by genes on the X chromosome
* Usually abnormal gene is recessive

X-LINKED/SEX LINKED DISORDERS:

* Generally seen in males:
* Women have 2 copies of X, therefore, one normal, dominant X chromosome
* Men have one X chromosome, therefore, no dominant gene to cancel out recessive gene

Example

- Let's say colourblindess is recessive and linked to the X chromosome. A woman who is a carrier XX' breeds with a normal male.



Example

	X	X’
X	XX	XX’
Y	XY	X’Y

Example

25% of females would be normal.

25% of females would be a carrier.

25% of males would be normal.

25% of males would be colourblind.

	X	X’
X	XX	XX’
Y	XY	X’Y

X-LINKED/SEX LINKED DISORDERS:

* If a daughter has an X-linked disorder, her mother was a carrier, her father had the disorder
* If you are a carrier, 1 in 2 chance a son will have the disorder and a daughter will be a carrier

X-LINKED/SEX LINKED DISORDERS:

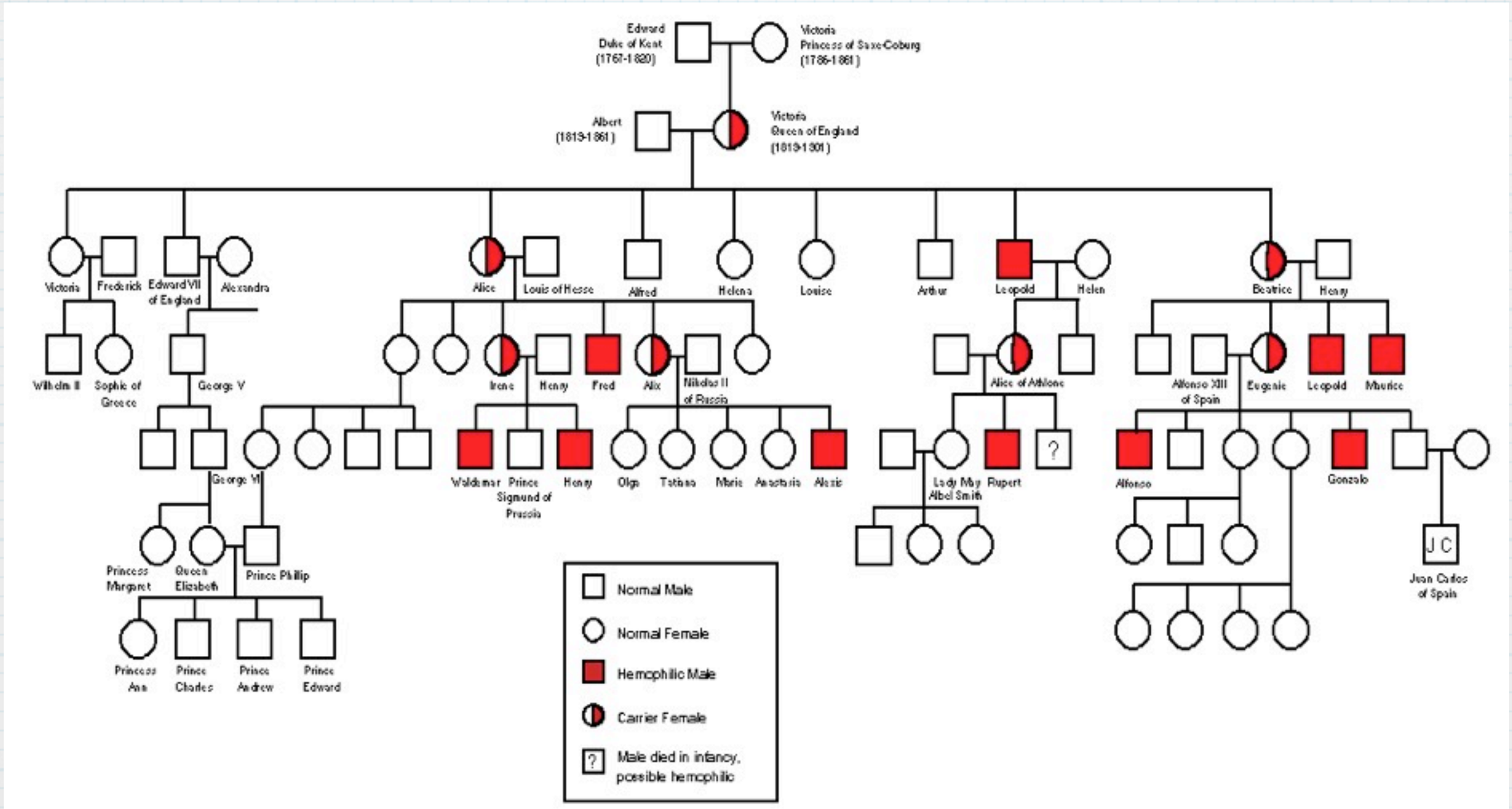
* Duchenne muscular dystrophy:
  * Most often affecting males
  * Weakness, muscle wasting
  * Death by around 30

X-LINKED/SEX LINKED DISORDERS:

* Fragile X Syndrome:
  * Most common cause of mental developmental issues
  * Piece of X chromosome is not fully attached

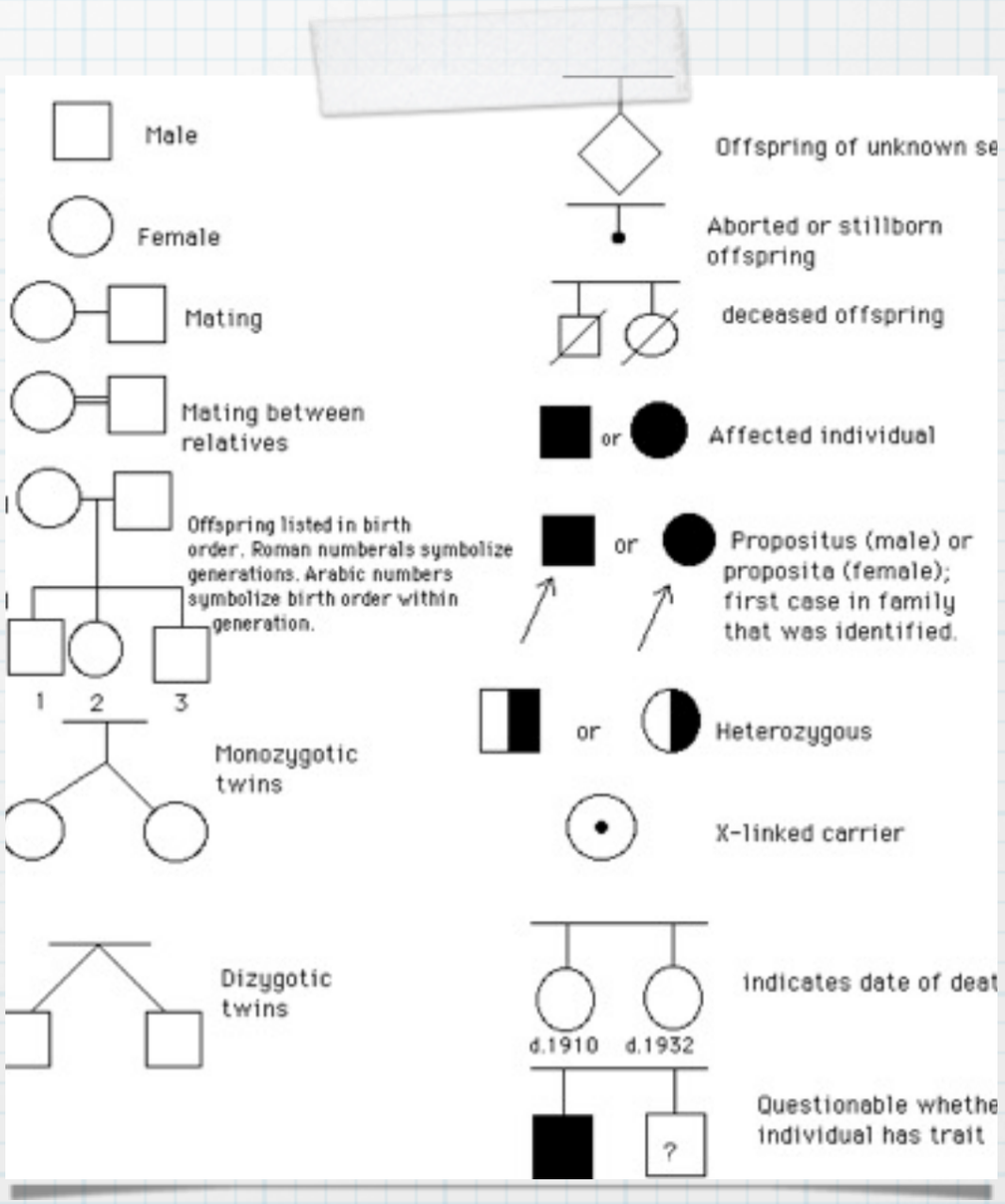
X-LINKED/SEX LINKED DISORDERS:

* HEMOPHILIA
* Blood lacks the substance needed to clot
* Known as the "Royal Disease" because it appeared in the descendants of Great Britain's Queen Victoria


Edward
Duke of Kent
(1767-1820)
Victoria
Princess of Saxe-Coburg
(1786-1861)
Albert
(1819-1861)
Victoria
Queen of England
(1819-1901)
Victoria
Frederick
Edward VII
of England
Alexandra
Alice
Louis of Hesse
Alfred
Helena
Louise
Arthur
Leopold
Helen
Beatrice
Henry
Wilhelm II
Sophie of
Greece
George V
Irene
Henry
Fred
Alix
Nikolas II
of Russia
Alice of Athlone
Alfonso XIII
of Spain
Eugenie
Leopold
Maurice
George VI
Waldemar
Prince
Sigmund of
Prussia
Henry
Olga
Tatiana
Marie
Anastasia
Alexis
Lady May
Abel Smith
Rupert
?
Alfonso
Gonzalo
J C
Juan Carlos
of Spain
Princess
Margaret
Queen
Elizabeth
Prince Phillip
Princess
Ann
Prince
Charles
Prince
Andrew
Prince
Edward
Normal Male
Normal Female
Hemophilic Male
Carrier Female
Male died in infancy,
possible hemophilic

PEDIGREES:

* A type of chart that shows patterns of transmission within a family



PEDIGREES

* Generally constructed after an undesirable genetic trait has appeared in a family, helps to determine if:
  - Gene is X-linked
  - Trait is dominant or recessive
  - Chance of transmission from parents to children