

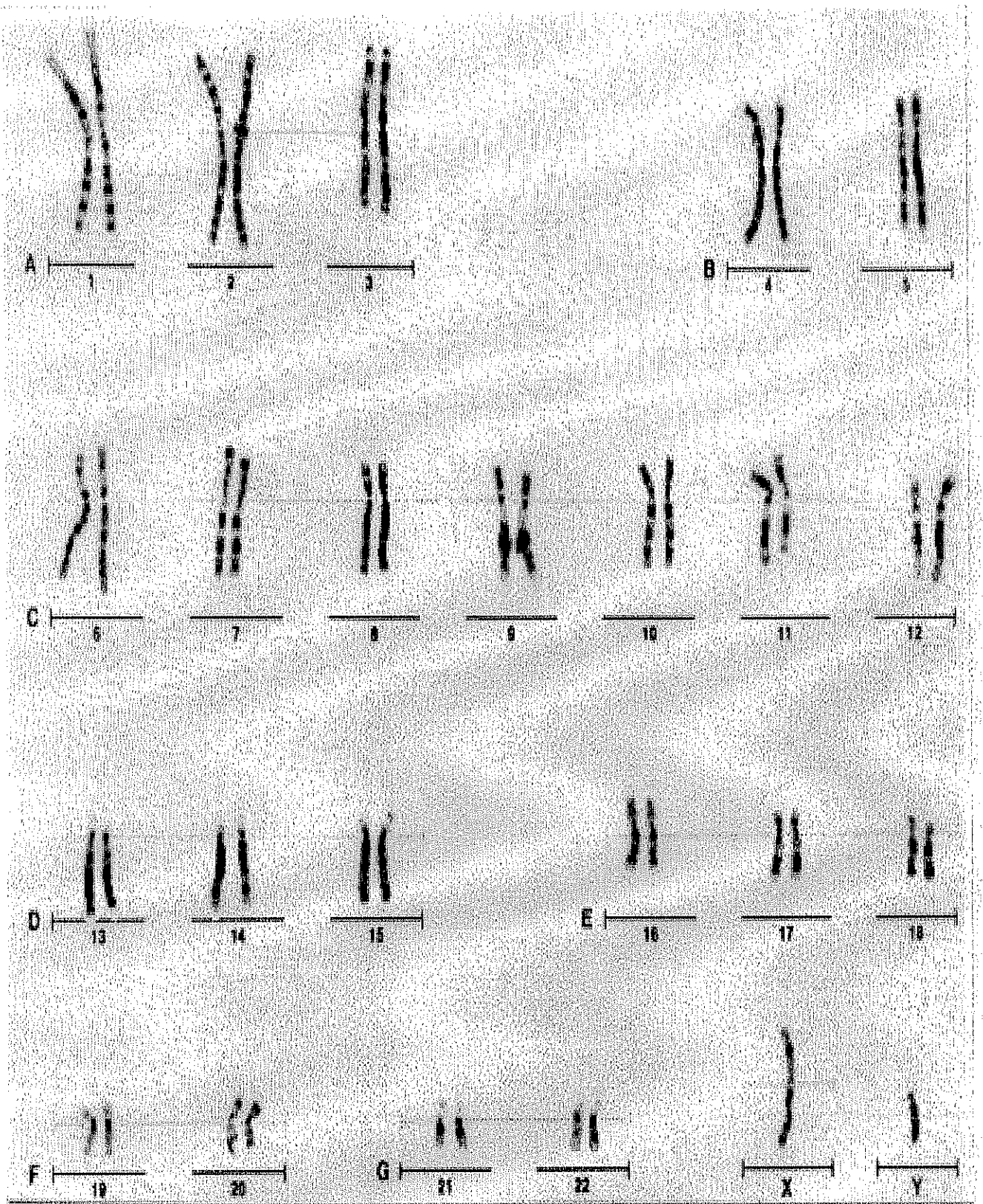
Name: \_\_\_\_\_ Date: \_\_\_\_\_

Life Science Notes 16  
Human Genetics: Sex Determination and Sex Linked Traits

- Determining the sex of an individual by its genes is actually a pretty simple thing to do.
  - After scientists studied fruit flies, which have only 4 chromosomes, they saw that male fruit flies had a special chromosome that female flies did not have.
  - Scientists called this chromosome a Y chromosome, because it was stunted and not as tall as a regular X - type chromosome.
    - Every male had an X and a Y chromosome.
    - Every female had two X chromosomes.
- This works the same way in people.
- This means that we can predict the probability that any child born will be male using the Punnett Square below.

	X	X
X	XX	XX
Y	XY	XY

Genotype: 50% XX, 50% XY  
Phenotype: 50% female, 50% male



## Sex-Linked Disorders

- Some genetic conditions are linked to the sex chromosomes X and Y.

These are called sex-linked disorders.

- Generally, the Y chromosome is considered a "recessive" chromosome because it does not contain as many genes as an X chromosome.

Because of this, an allele on the X chromosome will most always be shown in the phenotype of an individual who has a Y chromosome.

- There are several disorders that are linked to the X chromosome that are more common in males because of this issue.

- o Color- Blindness

- The inability to distinguish between two different colors such as Red and Green.

- This disorder is a recessive trait, so females will need to have two 2 alleles to have the disorder. This condition is rare for females.

- o Hemophilia

- The inability of the blood to clot properly. This can cause a person who has a minor cut to bleed and die.

- Like color blindness, this disorder is recessive. If a male has the allele, he will have the disorder. Females, however, require 2 recessive alleles to have the disorder.

### Color-Blindness Punnett Square

	$X^C$	$X^c$
$X^C$	$X^C X^C$	$X^C X^c$
$Y$	$X^C Y$	$X^c Y$

Genotype: 25%  $X^C X^C$ , 25%  $X^C X^c$ , 25%  $X^C Y$ , 25%

Phenotype: 25% normal female, 25% carrier female  $X^c Y$

Hemophilia Punnett Square 25% healthy male, 25% color-blind male

	$X^H$	$X^h$
$X^h$	$X^H X^h$	$X^h X^h$
$Y$	$X^H Y$	$X^h Y$