

BOOKLET 3: Sex Linked Traits

- girls have XX sex chromosomes
- boys have XY sex chromosomes where Y makes a boy, a boy (sex determination)
- typically sex link traits occur more in boys because they only have 1 X chromosome (what it says goes because the Y has no say on it, where on a female there is a second X chromosome which depending whether potential condition is dominant or recessive, can prevent a condition from appearing)

(eg) X^tX^t - 2 t's needed for colorblindness to appear on female

X^tY - only 1 t needed for condition to appear

X^tX - no condition will appear

Male sex linked traits

- males are either affected or are not affected
- cannot be carriers like females can
- dad always give Y chromosome to sons

Female sex linked traits

- can have dominant and recessive interactions (X^tX^t or $X^T X^t$)
- can be carriers (have the trait but does not show itself till passed down)
- get one X from mom and one from dad (he has only 1 to give)

How to do a X linked punnett

(eg) Red eyed female crossed with white eyed male

	X^R	X^r
X^r	$X^R X^r$	$X^r X^r$
Y	$X^R Y$	$X^r Y$

A good example of x linked gene

Color blindness in males and females
 Caused by gene carried on X only

<ul style="list-style-type: none"> • Female Genotypes: <ul style="list-style-type: none"> - $X^N X^N$ - normal female - $X^N X^n$ - carrier female - $X^n X^n$ - colorblind female • Phenotypes: <ul style="list-style-type: none"> - Normal or colorblind • Will the carrier be colorblind? NO: is a "N"(normal) on genotype 	<ul style="list-style-type: none"> • Male Genotypes: <ul style="list-style-type: none"> - $X^N Y$ - normal male - $X^n Y$ - colorblind male • Phenotypes: <ul style="list-style-type: none"> - normal and colorblind • Can males ever be carriers? <small>(carrier: has the gene but it does not surface)</small> NO. BUT: colorblind man can pass color blind gene to daughter "Xⁿ" but not to son as son gets a "Y" from father
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Sex limited Gene – both males and females have but only expressed in 1 sex
Sex Influenced Gene- has more effect on one sex than other (eg) baldness gene influenced by testosterone amount...so men get it more often

Gene Linkage...

What are linked genes? How are they inherited?

They will not separate except if _____ happens?

If genes cross over, we can figure out the FREQUENCY that this happens. So, the frequency indicates the amount of crossing over. (**cross over frequency**)

This leads us into **gene mapping...**

What affects cross over frequency? Distance genes are from each other

Genes that are further apart..

- _____ likely to cross over
- _____ likely to be inherited together

Genes that are closer together..

- _____ likely to cross over
- _____ likely to be inherited together

Cross over frequency often expressed in % but how else?

Gene mapping-

When using crossover frequency to figure out how far apart genes are, what is the 1 RULE used to start the gene mapping process

Be sure you know how to make a gene map from data using % or map units