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Solving genetic problems

BIOL3120 – LECTURE 6

Where to find the problem sets?

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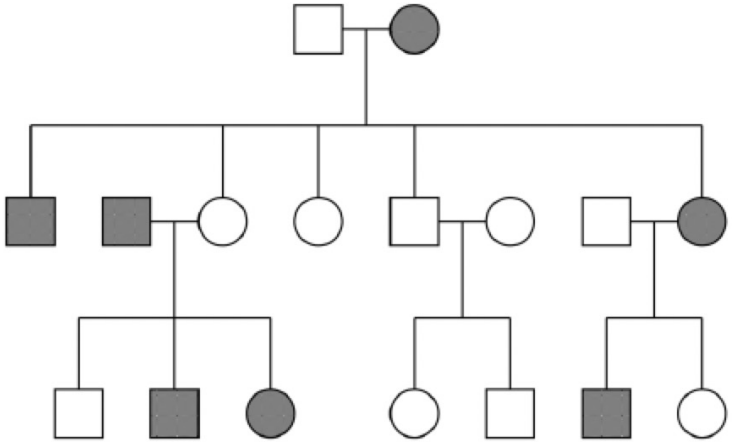
iLearn!

In the assessments tab

AT1

PROBLEM SET ASSESSMENT



1. **What is the *most likely* mode of inheritance for the condition shown in the above pedigree? Why?**

a) Autosomal dominant
b) Autosomal recessive
c) X-linked dominant
d) X-linked recessive

Special considerations

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Student wellbeing / special considera...

If you experience events or conditions that adversely affect your academic performance, please visit the special consideration page.

Visit the the Student Support webpage to see a range of services available to students at Macquarie University.

If you feel you are struggling with studies or have had disruptions in your personal life, you can speak to a trained professional at Campus Wellbeing.

Your job as geneticists is to work out which tools you can use

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You already know all the tools to solve genetic problems

- Using family trees to infer inheritance patterns
- Hardy-Weinberg equilibrium
- Punnett squares to find expected phenotypes
- Simple probability

Using family trees to infer inheritance patterns

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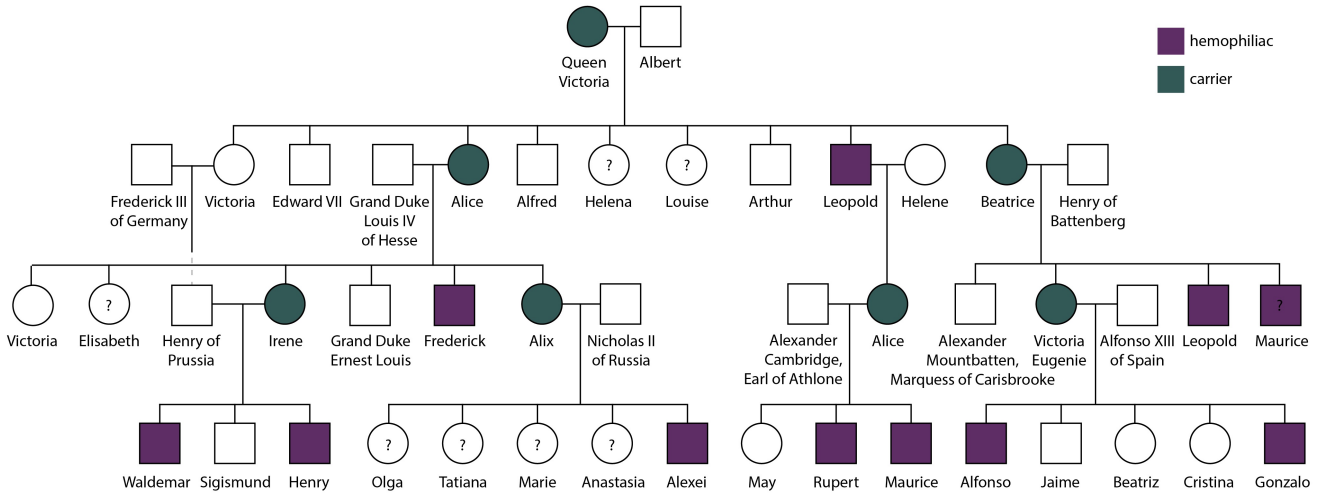
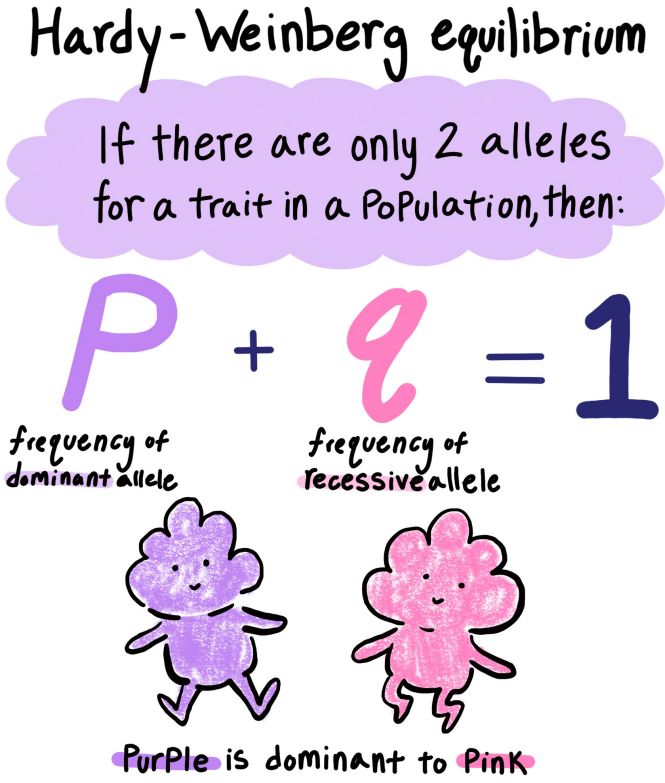
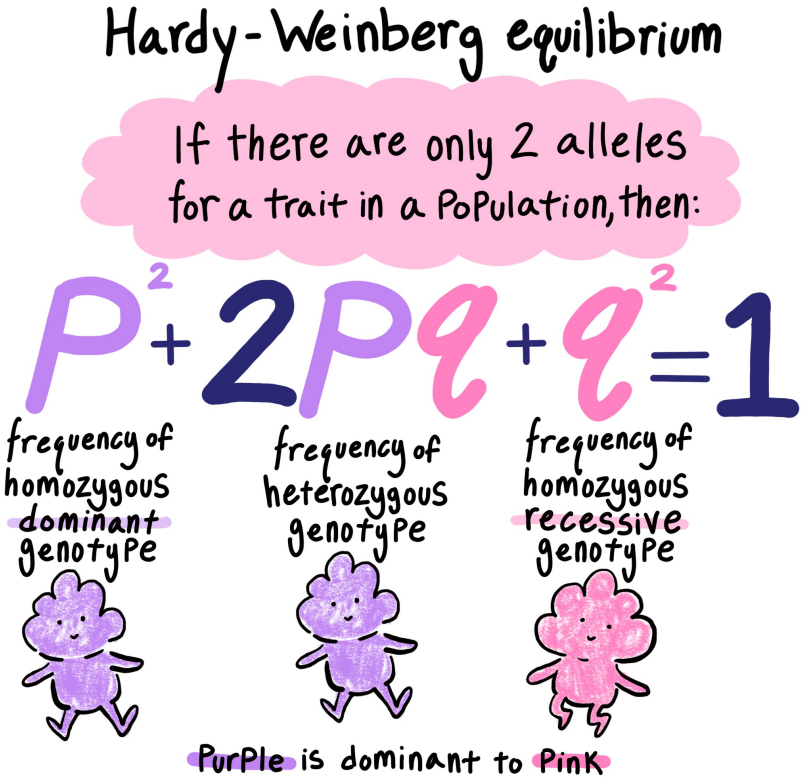
- Useful for inferring inheritance patterns
- Useful for inferring individual's genotype



Hardy-Weinberg equilibrium

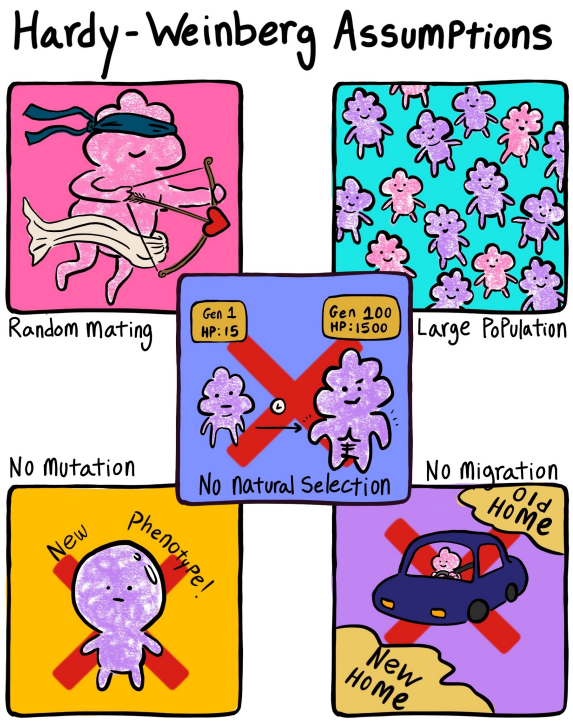




Hardy-Weinberg equilibrium

- Assumptions of Hardy-Weinberg equilibrium

1. Large population (avoids random chance having a big impact on allele frequencies).
2. No selection (ie no allele is necessarily more likely to get passed on than another)
3. Mating is random (ie any individual has an equal chance of mating with any other individual).
4. Mutation either does not occur or is in equilibrium.
5. Immigration and emigration do not occur.



Punnett squares to find expected phenotypes

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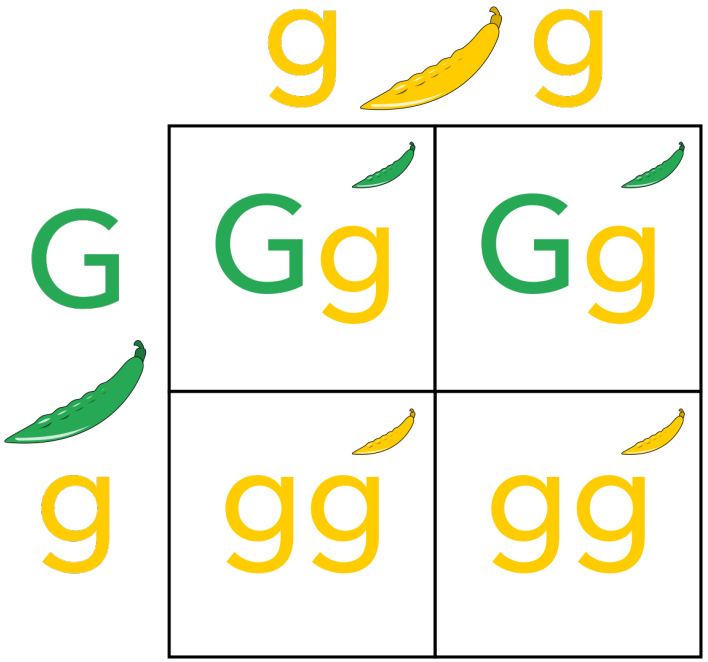
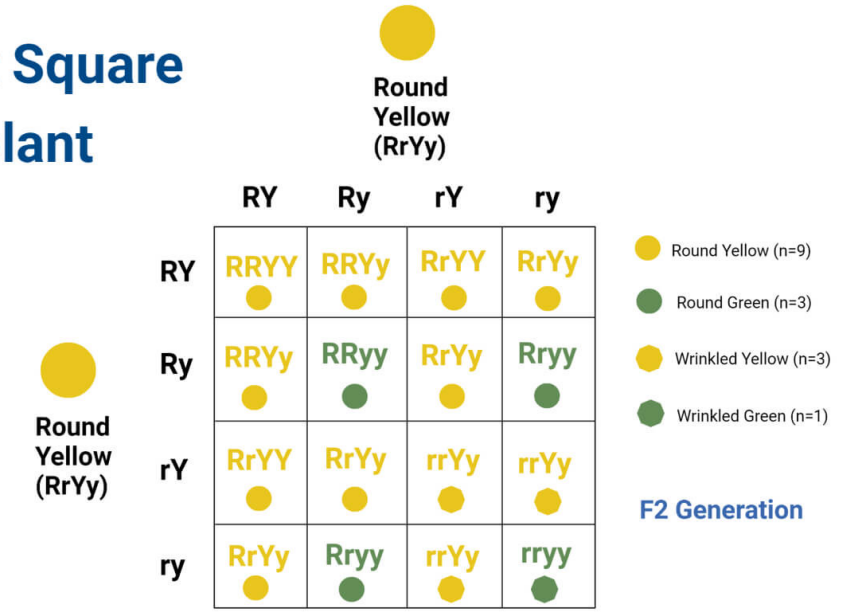
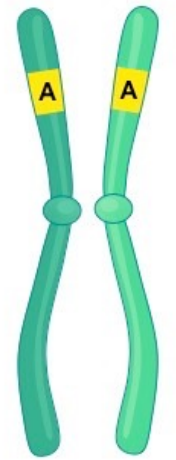
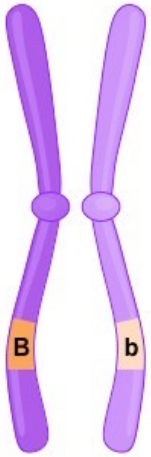




Punnett squares to find expected phenotypes

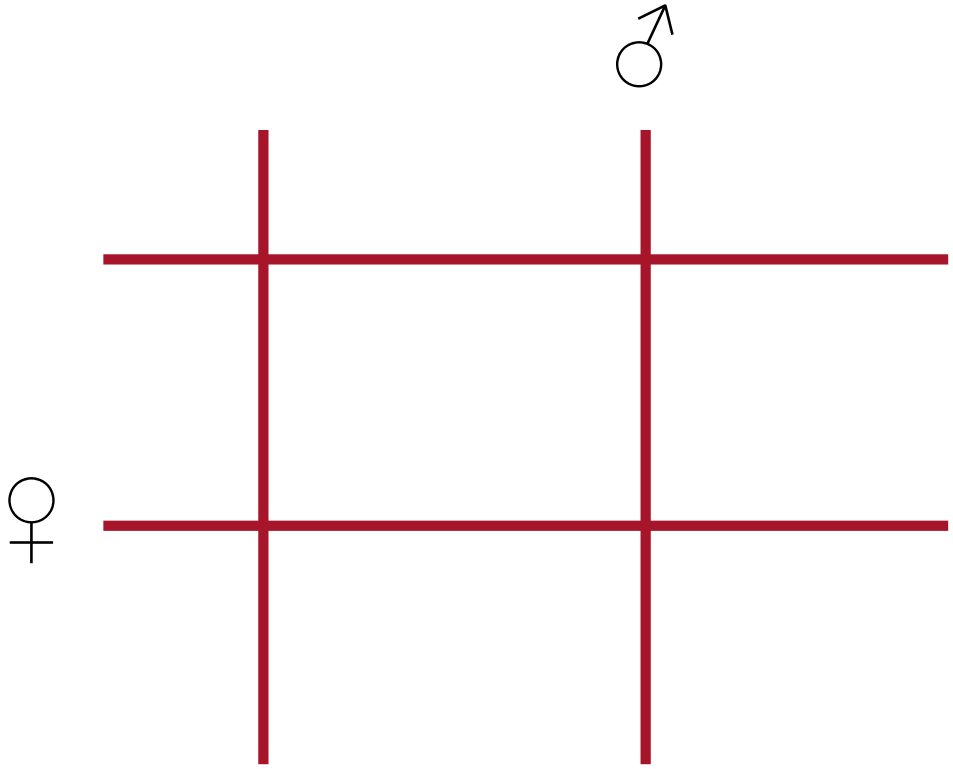


Homozygous
Alleles are same



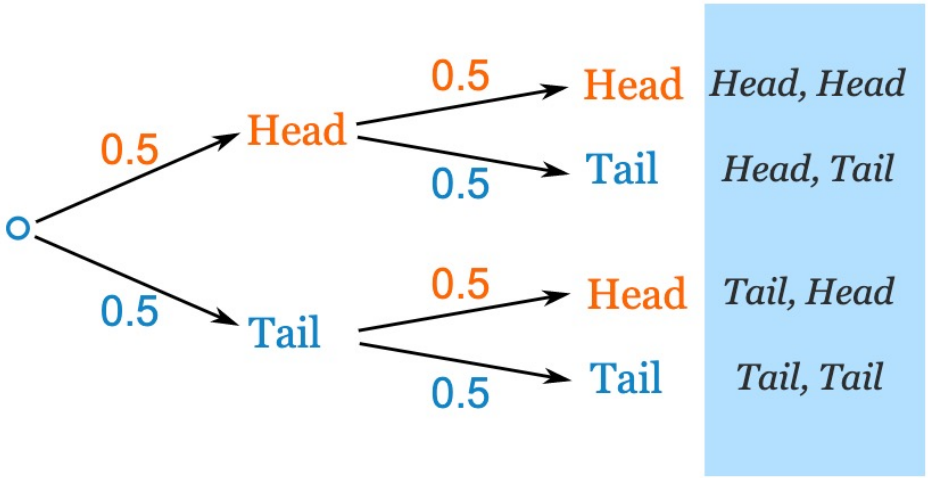
Heterozygous
Alleles are different

Hemizygous
Only one allele
(e.g. XY)



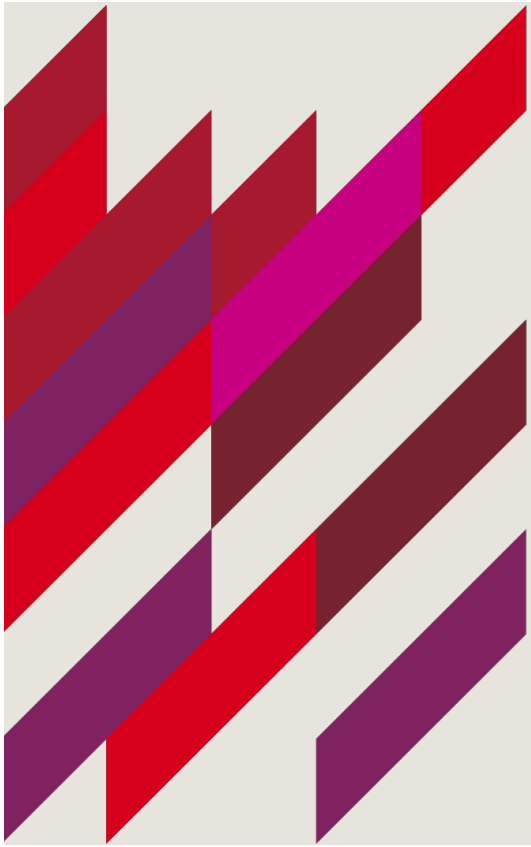
Simple probability

- If you need to think about a probability problem, draw a probability tree



Solving genetic problems

LEARNING OBJECTIVES



At the end of this lecture you should be able to:

- List the tools available to solve genetic problems
- Think about which tools may be useful in certain circumstances
- Be prepared to work through genetic problems in week 3 and beyond