Amoeba Sisters Video Recap: *Pedigrees*

Key

Autosomal Recessive Pedigree

Directions: Consider a pedigree that is tracking an autosomal recessive trait, where two recessive alleles (tt) result in the inability to taste a chemical known as PTC. The ability to taste PTC is determined by the presence of a dominant allele (T). Complete the missing boxes in the chart. The first row has been done for you as an example!

**Note: The ability to taste PTC may be more complex than a simple gene trait.*

	Individual Phenotype	Shape (in Pedigree)	Shaded?
Male with genotype TT	*PTC taster*	*Square*	*No*
Male with genotype Tt	1. Taster	2. Square	3. no
Male with genotype tt	4. Non-taster	5. Square	6. yes
Female with genotype TT	7. Taster	8. Circle	9. no
Female with genotype Tt	10. Taster	11. Circle	12. no
Female with genotype tt	13. Non-taster	14. Circle	15. yes

Design an Autosomal Recessive Pedigree!

A couple with **the ability to taste PTC** have two grown sons and one grown daughter. The sons have **the ability to taste PTC**. Their daughter is a **PTC non-taster**. She married a **PTC non-taster** man, and they have two sons.

Draw a pedigree in the box on the right that **fully represents the above scenario** and **tracks the inability to taste PTC (non-taster)**, which is caused by two recessive "t" alleles. In your illustrated pedigree, please make sure that:

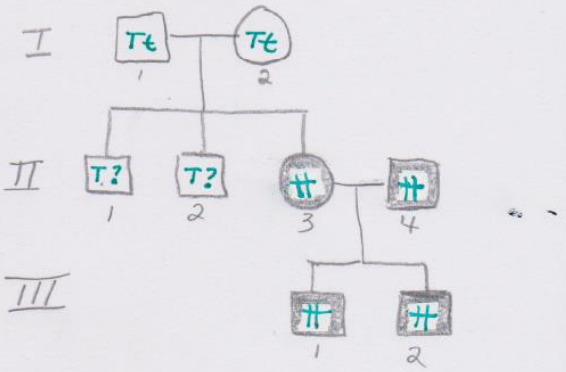
(A) generations are listed as Roman numerals and the individuals are numbered.

(B) the correct shapes for males and females are used.

(C) the shapes that require shading are shaded.

(D) the **genotypes** are listed next to each pedigree shape.

16.



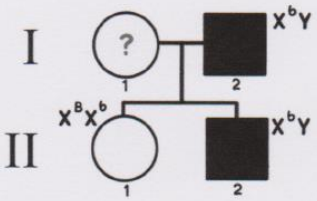
17. What is the **phenotype** of the sons in generation III? How do you know? 100% would be non-tasters. She is homozygous recessive (=non-taster) and marries a man who is also homozygous recessive. Both individuals can only pass on the recessive trait.

Sex-Linked Pedigrees

Sex-linked traits that are tracked in pedigrees are typically on the X chromosome. Assume the following questions refer to colorblindness, which is a sex-linked recessive trait on the X chromosome.

18. Circle the genotype(s) that represent(s) a **female** with the sex-linked recessive trait.
    X_BX_B X_BX_b X_bX_b X_BY X_bY

19. Circle the genotype(s) that represent(s) a **male** with the sex-linked recessive trait.
    X_BX_B X_BX_b X_bX_b X_BY X_bY



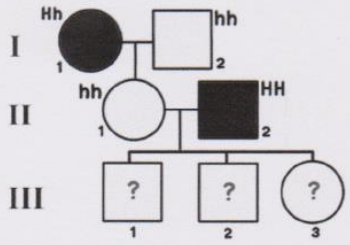
20. View the above sex-linked recessive pedigree. Can you be certain of generation I, individual #1's genotype? Why or why not? Yes. She is X^BX^b because males have only 1 X chromosome that they inherit from their mother. The son (II-2) is affected by the trait therefore inherited the trait from his mom.

21. All males receive their X chromosome from their Mother.

22. How are sex-linked pedigrees different from autosomal pedigrees? ① More males affected than females. ② All affected females have affected fathers ③ Affected males have heterozygous (carrier) mothers

Autosomal Dominant Pedigree

What about tracking an *autosomal* **dominant** trait, such as having a widow's peak? The presence of one dominant allele for this widow's peak hairline (H) will result in an individual having a widow's peak. Since this pedigree is tracking an autosomal dominant trait, shaded shapes have a widow's peak hairline. **Note: In reality, this trait may be more complex than just a simple gene.*



23. How many dominant alleles does an individual need in order to have the autosomal dominant trait? 1

24. Is it possible to know the genotypes of the three children in generation III? Yes
Should their shapes be shaded? Yes Explain your answer to both questions.

All 3 children would be Hh thus affected by the trait and have shaded symbols. This is because the father is homozygous for the dominant trait and therefore passes the dominant trait to all his children.