

The Secrets of Bedrock With Fred & Wilma

Background

Geneticists have succeeded in sequencing the genes on the sex chromosomes of Bedrock's most famous couple, Fred and Wilma Flintstone. Shocking discoveries have been made - the secrets of Bedrock can now be revealed.

Part I: Flintstone Family Secret Analysis

Use the data for Fred & Wilma's sex chromosome in the tables below to answer questions 1-15 in the spaces provided.

Traits on the X chromosome (in the order they appear from top to bottom)



Dominant	Recessive
O - predisposed to obesity	o - not predisposed to obesity
N - Normal vision (can see red and green)	n - red-green colorblindness
B - Normal hair growth	b - baldness
H - Normal blood clotting	h - hemophilia (blood does not clot)
D - Normal hearing	d - deafness
P - Pigmented eyes (brown, blue, or green)	p - red eyes (no pigment)
E - Faulty tooth enamel	e - normal tooth enamel
S - Sweat glands present	s - sweat glands absent
M - Not predisposed to migraines	m - predisposition to migraines

Trait on the Y chromosome

Dominant	Recessive
H - hair growth in ears absent	h - hair growth in ears present

1. Use the genotype for Fred and Wilma to figure out their phenotype.

Write each phenotype in the space provided in the table.

X-Linked Traits				
Trait	Fred's Genotype	Fred's Phenotype	Wilma's Genotype	Wilma's Phenotype
Obesity	$X^O Y$	Obesity	$X^O X^o$	No obesity
Color Vision	$X^N Y$		$X^N X^n$	
Hair Growth	$X^B Y$		$X^b X^b$	
Blood Clotting	$X^H Y$		$X^H X^h$	
Hearing	$X^D Y$		$X^d X^d$	
Eye Pigment	$X^P Y$		$X^P X^p$	
Tooth Enamel	$X^E Y$		$X^e X^e$	
Sweat Glands	$X^S Y$		$X^s X^s$	
Migraines	$X^M Y$		$X^M X^M$	

Y-Linked Traits				
Trait	Fred's Genotype	Fred's Phenotype	Wilma's Genotype	Wilma's Phenotype
Ear Hair	$X Y^h$		$X X$	

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2. Can Wilma tell the difference between red and green Christmas lights? _____ (YES or NO). **Explain**
3. Does Wilma have faulty tooth enamel? _____ (YES or NO). **Explain**
4. Do you think Wilma has to get her hair cut & colored often? _____ (YES or NO). **Explain**
5. Are there traits for which Wilma is a carrier? If so, list all of them or explain why not.
6. Are there traits for which Fred is a carrier? If so, list all of them or explain why not.
7. Is Fred lying when he tells Wilma that he thinks her hair is a gorgeous shade of red? _____ (YES or NO).
Explain
8. A dedicated pet owner, Fred walks Dino once a day, but has a hard time **cooling** his body down. Explain why this is true. (hint: what feature helps people lose heat when they are exercising).
9. Does Fred need to wear a toupee (which is a wig for a man)? _____ (YES or NO). **Explain**

10. Does Pebbles (their **daughter**) need to be treated for faulty tooth enamel? Set up a Punnett square to show your answer. **Answer YES or NO and circle the possible genotypes of Pebbles** in the Punnett Square.

11. Does Pebbles wear a wig? Set up a Punnett square to illustrate your answer. **Answer YES or NO and circle the possible genotypes of Pebbles** in the Punnett Square.

12. What percent chance does Pebbles have to be predisposed to obesity? Show work

13. If Fred and Wilma had a son, what are his chances of having normal vision? Show work

14. Does Wilma get angry when Fred screams...**"WILMAAAAAAAAAA"**? **Explain**
15. What chance does Pebbles have to develop hairy ears? **Explain**

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Part 2: Family or Fraud?

A young man named "Frederick" has just arrived in Bedrock, and he claims to be the son of one of the Flintstones. Who fathered/mothered Frederick? It's up to you to solve this mystery. Fortunately, Frederick agreed to DNA sequencing and the results are in!

Procedures:

Use Fredrick's X and Y chromosomes to answer the following questions.

16. Fill in Frederick's genotype for each sex-linked trait in the table below.

Trait	Frederick's Genotype	Frederick's Phenotype
Obesity	$X^{o}Y$	No obesity
Color Vision	$X^{m}Y$	
Hair Growth	$X^{h}Y$	
Blood Clotting	$X^{t}Y$	
Hearing	$X^{D}Y$	
Eye Pigment	$X^{p}Y$	
Tooth Enamel	$X^{e}Y$	
Sweat Glands	$X^{s}Y$	
Migraines	$X^{m}Y$	
Ear Hair	$X Y^{H}$	

17. Could Fred be the father of Frederick? Provide "genetic evidence" to support your answer.

18. Could Wilma be Frederick's mother? Provide "genetic evidence" to support your answer.

Concluding Questions:

19. Which parent determines the gender of the child? Explain why.

20. Why are males affected by recessive sex-linked diseases more often than females?

21. If a male has a disease that is Y-linked, what percentage of his sons will inherit the disease?

22. If a male has a disease that is Y-linked, what percentage of his daughters will inherit the disease? What percentage will be carriers?

