HEREDITY AND VARIATION

LESSON 2 – NON-MENDELIAN INHERITANCE

INTRODUCTION OF THE LESSON

Bot: Hello, SCI-learner! Welcome back to our science journey here in Roxas City, Capiz, where family resemblances are often noticed during fiestas, reunions, and even at the streets.

Bot: You already know that traits are passed from parents to children but did you know that not all traits follow Mendel's simple rules?

Bot: Today, we'll explore Non-Mendelian Inheritance—patterns of inheritance that explain why traits like blood type, skin color, and some diseases don't follow the usual dominant–recessive pattern.

Bot: Ready to level up your genetics knowledge?

User:

▶️ Yes, let's go!

▶️ I'm ready!

Fa-SCI-nate

Bot: Imagine this...
In a family from Roxas City, one child has blood type AB, while the parents have type A and type B.

Bot: How is that possible?

User:

▶️ Because traits can blend
▶️ Because of multiple alleles
▶️ I'm not sure

Branching Response:

Bot (Correct – Multiple alleles): Correct! Some traits are controlled by more than two alleles.

Bot (Incorrect / Not sure): Not quite. Blood type is an example of multiple alleles, not simple blending.

Goal SCI-tting

Bot: By the end of this lesson, you will be able to:

1. Explain different patterns of non-Mendelian inheritance
2. Differentiate multiple alleles and polygenic traits
3. Explain why sex-linked traits are more common in males

Bot: These goals will help you understand complex traits in real life.

User:

▶️ Continue

Pre-SCI-ntation

Bot: Gregor Mendel discovered basic rules of inheritance using pea plants.

Bot: However, scientists later found that many traits do not follow Mendel's rules.

Bot: These traits follow Non-Mendelian inheritance, where:
• Traits may blend
• Both alleles may be expressed
• More than two alleles may exist
• Traits may depend on many genes
• Traits may be linked to sex chromosomes

Inve-SCI-tigation

Part 1: Incomplete Dominance

Bot: In incomplete dominance, neither allele is fully dominant.

Bot: The heterozygous individual shows a blended or intermediate trait.

Bot: Example:
Red flower + White flower → Pink flower

Bot: What phenotype appears in a heterozygous individual?

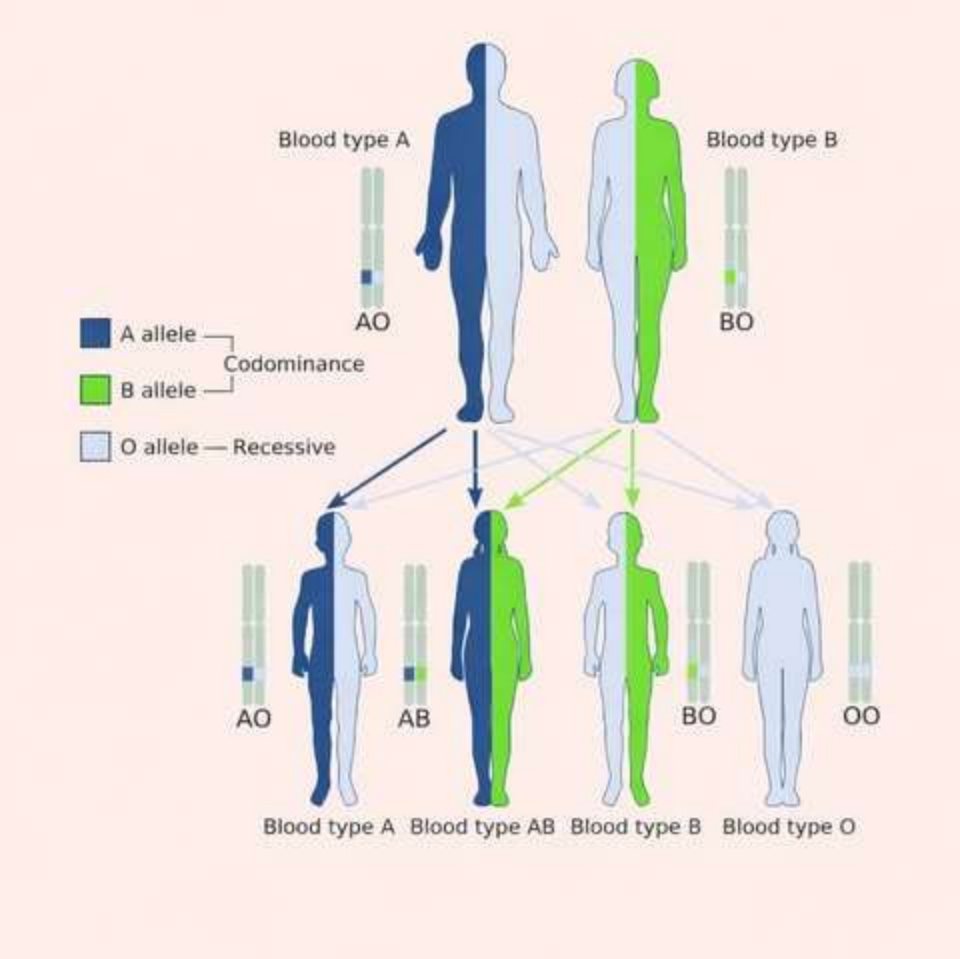
User:
▶️ One dominant trait
▶️ A blended trait

Bot: Correct! Incomplete dominance results in a blended phenotype.

Part 2: Codominance

Bot: In codominance, both alleles are equally expressed.

Bot: Example:
Blood type AB shows both A and B antigens.



Bot: Is there a recessive allele in codominance?

User:

- Yes
- No

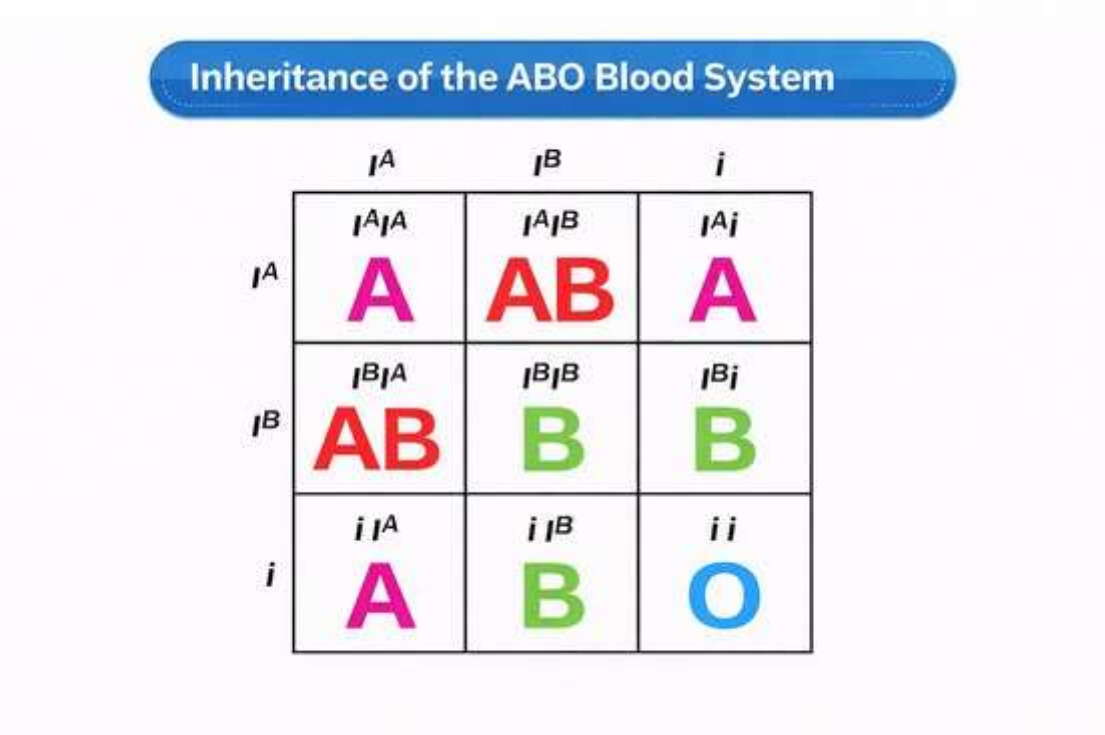
Bot: Correct! There is no recessive allele in codominance.

Part 3: Multiple Alleles

Bot: Multiple alleles mean that more than two alleles exist for a trait.

Bot: Example: ABO blood group system
Alleles: A, B, and O

Bot: Even though there are three alleles, a person only gets two—one from each parent.



Bot: Which blood type is recessive?

User:

- A
- B
- O

Bot: Correct! Blood type O is recessive.

Part 4: Polygenic Traits

Bot: Some traits are controlled by many genes working together.

Bot: These are called polygenic traits.

Bot: Examples include:
Height
Skin color
Hair color

Bot: Why do people in Roxas City have different skin shades?

User:

▶️ Because of one gene

▶️ Because of many genes and environment

Bot: Correct! Polygenic traits involve many genes and environmental effects.

Part 5: Sex-linked Traits

Bot: Some genes are found on the X chromosome.

Bot: These traits are called sex-linked traits.

Bot: They are more common in males because males have only one X chromosome.

Bot: Which condition is a sex-linked trait?

User:

- ▶ Hemophilia
- ▶ Height
- ▶ Blood type

Bot: Correct! Hemophilia is a sex-linked trait.

Self-A-SCI-ssment

Bot: Let's check your understanding!

(Note: provide space box for answers)

Bot:

1. What is the difference between incomplete dominance and codominance?
2. Why are polygenic traits more varied?
3. Why are sex-linked traits more common in males?

User:

- ▶ Because males have only one X chromosome
- ▶ Because males inherit more genes

Bot: Correct! Males express recessive X-linked traits because they have only one X chromosome.

SCI-pplementary

Bot: Did you know?
About 5% of Asian males have some form of color blindness.

Bot: Today, special eyeglasses can help people with color blindness see better.

Bot: Understanding genetics helps families make informed health decisions.

CLOSING

Bot: Great job, SCI-learner! You've learned how traits can be inherited in more complex ways than Mendel first discovered.

Bot: In the next lesson, we'll explore probability and inheritance patterns.

Bot: Padayon sa pagtu-on sa SCI-ensiya! See you in the next lesson!