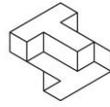


Nature or Nurture?

Lab Related Activity: *DNA and Genetics*



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In the DNA lab students experimented with PTC papers to figure out what their genetic make-up is for one trait. Many families like to talk about traits handed down from one generation to another. In this activity, students are asked to think of a trait that has been passed down in their family and to generate a stance on whether they think this is a genetic trait, something that individuals develop as part of the family environment, or some combination.

Grades: 6-12 | **Estimated Time:** 15-30 minutes

Student Outcomes

Students will be able to identify inheritable traits.

Students will be able to categorize traits as genetic, not genetic, or combination.

Next Generation Science Standards

Grades 6-8: MS-LS1-5; MS-LS4-5

Grades 9-12: HS-LS3-1

California State Science Standards

Grade 7: Genetics 2.b, c, e; I&E7.c

Grade 9/10: Genetics 2.e

Common Core ELA Standards

Grade 6: WA2.2a-d

Vocabulary

Familiarity with these terms and concepts will enhance students' experience in the activity.

- **Genetic Trait:** the branch of biology concerned with the study of heredity and variation in organisms
- **Heredity:** The genetic transmission of characteristics from parent to offspring.
- **Trait:** A distinguishing feature, as of a person's character.
- **Epigenetics:** the study of changes in organisms caused by modification of gene expression rather than alteration of the genetic code itself.
- **Adaptation:** a change or the process of change by which an organism or species becomes better suited to its environment.

Materials (one set per student)

- (whole class) Board
- Paper
- Writing materials

Teaching points:

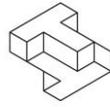
1. Have you ever heard someone say something like, "oh it is in their nature" "oh it's in their genes" "they were born to do that". Today I want us to discuss when that is an expression, when is it a scientific truth, and when it is something in-between.
2. QUESTION: What is a genetic trait?
Possible answers could include: earlobe attachment, tongue rolling, dimples, handedness, freckles, curly hair, colorblindness
3. QUESTION: What about personality or physical ability or height? What else could contribute to these traits?
Answer: Maybe or parts of these could be genetic, but there are also environmental factors like access to healthy food or exercise, access to clean food and water, etc.
4. QUESTION: What about being a good leader? Moving a lot? Liking a particular type of movie or music?
Answer: No, this has nothing to do with genetics and more to do with opportunities, work, and the ability to adapt. There could be traits that could help with these things, but there isn't a clear connection to a trait like eye or hair color.

Procedure:

5. Draw a Venn diagram on the board and label the outer rings: "Genetic Trait" and "Not a Genetic Trait". In the middle

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write "Combination". Have students think of things that they have heard of as traits or things that run in their family at home and as a class decide where they fit in the diagram.

Possible examples:

Lots of people in my family are teachers – Not a genetic trait

We move around a lot – Not a genetic trait

We all have hazel eyes – Genetic trait

We are mostly tall – Combination

We joke around all of the time – Could be combination or not a genetic trait (discuss)

6. Ask students to consider their family and pick something they have noticed that many of them have in common. Complete a quick write on:
 - a. Identifying the common trait
 - b. Decide whether they think this trait is genetic, not genetic, or a combination of factors.
 - c. Defend their decision.
7. Have students turn in their quick write.

Teaching Points:

8. QUESTION: What are some of the traits you have written about?
9. QUESTION: What are some traits that a lot of people have in common? What are traits we might have in common with someone who lives near a desert, in a rainforest, or on another continent?
10. Humans have 99% of their DNA in common with each other.

Taking it Further

- Have students research whether or not some of their "genetic traits" are truly genetic. Some traits that have been commonly considered purely genetic, such as tongue rolling, are actually a combination of genetic and environmental interactions. Students should present what they learned about their trait to the class.
- Students prepare and participate in a Socratic Seminar on the topic of what we currently know about DNA and genetics.
- Have students interview a family member about their family's history and what traits they have seen across the family.
- Create a chart that shows humans DNA similarities with other organisms.