



DNA and Genetic Traits – LAB SUMMARY

This lab introduces your students to DNA, the blueprint for life, and allows them to spool and view real DNA from real cells. Students will also explore their own genes through an exercise about dominant and recessive traits.

Grade Levels: 4-8

Educational Outcomes:

- 1) Students will learn basic information about genetics and inherited traits.
- 2) Students will learn about the role of DNA in determining physical human traits.
- 3) Students will learn the basic structure of an animal cell.

Estimated Time: 1.5 hours

- Introductory Discussion of DNA and genetics: 5 minutes
- Cheek Cell Experiment: 15 minutes
- DNA spooling experiment: 35 minutes
- Introductory Discussion of Genetics and Inherited Traits: 10 minutes
- Inherited Trait Worksheet Activity: 10 minutes
- Taste Testing: 10 minutes
- Summary and Closing: 5 minutes

California Science Content Standards Connections:

- **Grade 7: Life Science: 1a, 1c, 1e, 2b, 2c, 2d, 2e**
- **All grades** - Investigation and Experimentation: Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations.

Pre-Visit Vocabulary

These are words and concepts that we will discuss in the lab. Your students' lab experience will be enhanced if they are familiar with these terms prior to your visit.

- **Allele:** Any of the possible forms in which a gene for a specific trait can occur
- **Cell:** the basic structural unit of all organisms.
- **DNA (deoxyribonucleic acid):** the genetic material of living organisms, located in the chromosomes of each cell
- **Dominant:** the one of a pair of alternative alleles that masks the effect of the other when both are present in the same cell or organism.
- **Gene:** the basic physical unit of heredity
- **Nucleus:** A large, membrane-bound structure within a living cell, containing the cell's hereditary material and controlling its metabolism, growth, and reproduction.
- **Punnett Square:** a type of grid that can indicate all the possible outcomes of a genetic cross (See Post Take Home Activity provided by Tech Instructor)
- **Recessive:** one of a pair of alternative alleles whose effect is masked by the activity of the second when both are present in the same cell or organism
- **Trait:** A genetically determined characteristic or condition



Tech Museum Gallery Connections:

- Life-Tech Gallery
 - Genetics: Technology with a Twist
 - This exhibit covers many aspects of genetics, including:
 - Genetic Testing
 - Transplants
 - The ethical issues
 - A wet lab where students can create a jellyfish protein
 - Ask a Gene Scientist

DNA and Genetic Traits: Teacher Resources

- Kids Genetics @ GlaxoSmithKline: great online games and activities for grades 4-7 – http://genetics.gsk.com/kids/index_kids.htm
- Genetics Education Partnership: Database of Tools to purchase - <http://genetics-education-partnership.mbt.washington.edu/cool/coolgrade.html>
- Time.com: The Genetics Revolution: Summary of Genetics Breakthroughs - <http://www.time.com/time/daily/special/genetics/>
- PBS NOVA Online: Cracking the Code of Life: curriculum supplements <http://www.pbs.org/wgbh/nova/israel/>
- PBS NOVA Online: Cracking the Code of Life: curriculum supplements <http://www.pbs.org/wgbh/nova/genome/teacherresources.html>
- University of Utah Genetic Science Learning Center: Pre-and Post activities - <http://learn.genetics.utah.edu/teachers/tindex/>

Pre- and post activities/handouts:

- Online Genetics Game: Fun for a Pre-Visit activity http://www.tryscience.org/experiments/experiments_dna_online.html
- Dozens of other simple activities for middle and high-school students are available at: http://serendip.brynmawr.edu/sci_edu/waldron/
- Toothpick Fish activity: Genetics and Natural Selection in the context of an environmental disaster - <http://chroma.gs.washington.edu/outreach/genetics/download.html>
- **Try our take home lesson plans provided in your teacher packet. They are easy and fun!**
“It Takes Two” (How does a Punnett square predict possible gene combinations- Hands-on science activity) and “**Boy or Girl**” (What are the chromosome combinations that produce a boy or a girl? Hands-on science activity)