DNA Extraction

The *DNA Extraction* lab is an activity to facilitate learning about cells and the structures inside of them while using the scientific method to develop and test a hypothesis.

All living things are made of cells. Most cells contain deoxyribonucleic acid, or DNA, the blueprint of all living things. In prokaryotes, single-celled organisms such as bacteria, the DNA is floating freely in the cytoplasm of the cell. In eukaryotes, multi-celled organisms, the DNA is enclosed within a nucleus. DNA contains the genetic code needed to synthesize proteins.

During the laboratory activity students will develop and test a hypothesis, use positive and negative controls, and determine if fruit from a plant is biotic or abiotic. Students will also extract and visualize DNA.

**LEARNING OBJECTIVES**

**Students will know:**

* The structure and process of the scientific method
* How to extract DNA from fruit
* What is DNA

**Students will understand:**

* Biotic and abiotic factors
* The importance of Positive and negative controls during an experiment
* That DNA is found is all living things

**Students will be able to:**

* Formulate and test a hypothesis using the scientific method
* Observe fruit DNA

**UNIT PLAN**

**Pre-Laboratory Engagement (30 minutes)**

1. Students will read the Science Buddies [article](https://www.sciencebuddies.org/science-fair-projects/science-fair/steps-of-the-scientific-method#keyinfo) and watch the Brain Pop Jr [video](https://www.youtube.com/watch?v=_3wzx2C6Bt8) (4:26) about the scientific method.
   1. Students will then complete the [Scientific Method Quiz.](https://drive.google.com/open?id=1m-zXVdsrOgpbj1tzwgHdI_tYds_zm02XocTcN7UCPho)
   2. [Scientific Method Quiz Answer Key](https://drive.google.com/open?id=1p6a9Cdutk05dC3OXtFb8Crfrn-JkVEHH4tNnFtgPTM4)
2. Students will read the Duckster’s [article](https://www.ducksters.com/science/biology/dna.php) and watch the Dr. Binocs Show [video](https://www.youtube.com/watch?v=6368Y-OfU9U) (6:42) about DNA
   1. Students will then complete the [DNA Quiz](https://drive.google.com/open?id=1W1JeAHatxbcDfN3--rpu6QX00jJdSb4RdTCYPgD36P8)
   2. [DNA Quiz Answer Key](https://drive.google.com/open?id=1KUKC1hj6abBFzw1KtD6xRg5PYXeFqHB1AVMHe9YrZlc)

**Laboratory Activity (30-40 minutes)**

1. Students will watch a video introduction to the lab, [“DNA Extraction: Part One “](https://vimeo.com/417218993) (2:18)
2. Students will watch the lab video introducing the controls in [“DNA Extraction: Part Two”](https://vimeo.com/417220436)  (5:57)
   1. Students will complete their hypothesis and Part I. II, and III on their [student worksheet](https://drive.google.com/open?id=1oandlsjyKplVzj4Xogaz7velN3GItrFgR-hTaVqRDWY)

**Post-Laboratory Extension (30-45 minutes)**

1. Students will watch the video to conduct a DNA extraction at home, [“DNA Extraction: Part Three”](https://vimeo.com/417221470) (8:17)
2. Students may complete the DNA extraction on their own with parental supervision or may use the result provided in the video.

* Participating students will make the Extraction buffer used in the experiment using this [recipe](https://drive.google.com/open?id=1yKbIw5MPEdMqHMYVG8ZSeQ_gfivF1DE__lAeWAeQDlo).
* Students will complete Part IV, V, and VI on their[student worksheet](https://drive.google.com/open?id=1oandlsjyKplVzj4Xogaz7velN3GItrFgR-hTaVqRDWY)
  + [Worksheet Answer Key](https://drive.google.com/open?id=1xSsHTv0iPikoBb7o3_hqiXuLMwNeBW1_XbPMU74SNdw)
* Students may be provided this video [walkthrough](https://vimeo.com/417223566) (13:50) of the student handout before or after submitting their responses.

**STANDARDS ALIGNMENT**

**NGSS CONNECTIONS**

**MS-LS1-1.** Conduct and investigation to provide that living things are made of cells; either one cell or many different numbers of types of cells.

**MS-LS1-2.** Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.

**TEKS CONNECTIONS**

**6.12(A):** understand that all organisms are composed of one or more cells;

**6.12(E):** describe biotic and abiotic parts of an ecosystem in which organisms interact;

**7.14(A):** define heredity as the passage of genetic instructions from one generation to the next generation

**7.14(C):** recognize that inherited traits of individuals are governed in the genetic material found in the genes within chromosomes in the nucleus.

**LOUISIANA STANDARDS FOR SCIENCE CONNECTIONS**

**MS-LS1-1.** Conduct and investigation to provide that living things are made of cells; wither one cell or many different numbers of types of cells.

**MS-LS1-2.** Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.