

Grade & Course: 11th/12th Forensic Science		Topic: Biological Evidence- DNA Profiling	Duration: 3 weeks
Teachers: Forensic PLC Teachers			
<b>Georgia Standards and Content:</b> SFS3. Obtain, evaluate, and communicate information relating to biological evidence in forensic investigations. e. Plan and carry out an investigation involving DNA processing and analysis.			
Narrative / Background Information			
<b>Prior Student Knowledge: (REFLECTION – PRIOR TO TEACHING THE UNIT)</b> Students should have background knowledge from biology about DNA and gel electrophoresis. Students should also be able to differentiate between latent fingerprints and DNA fingerprinting.			
<b>Year-Long Anchoring Phenomena: (LEARNING PROCESS)</b> An unidentified body was found in the back seat of a wrecked vehicle where the driver had fled the scene and the passenger was injured.			
<b>Unit Phenomena (LEARNING PROCESS)</b> In 1984, a boy named Andrew was not allowed to return to his country until his identity was proven through DNA analysis.			
<b>Inquiry Statement:</b> As technology advances, forensics scientists are able to analyze smaller and smaller biological samples to develop a DNA profile.			
<b>Global Context:</b> Scientific and Technical Innovation			
<b>Science &amp; Engineering Practices:</b> <ul style="list-style-type: none"><li>Planning and Carrying Out An Investigation</li></ul>	<b>Disciplinary Core Ideas: (KNOWLEDGE &amp; SKILLS)</b> <ul style="list-style-type: none"><li>History of DNA profiling</li><li>Characteristics of Blood and DNA profiling</li><li>Collection and preservation of DNA evidence</li><li>Forensic analysis of DNA</li></ul>	<b>Crosscutting Concepts: (KNOWLEDGE &amp; SKILLS)</b> <ul style="list-style-type: none"><li>Patterns</li></ul>	
		<b>Key and Related Concepts:</b> <ul style="list-style-type: none"><li>Communication</li><li>Patterns</li></ul>	
<b>Possible Preconceptions/Misconceptions: (REFLECTION – PRIOR TO TEACHING THE UNIT)</b> Students may think that fingerprinting and DNA fingerprinting are the same thing. Students may also believe that DNA can be found at every crime scene and is always conclusive which is not accurate.			
<b>Key Vocabulary: (KNOWLEDGE &amp; SKILLS)</b> Allele Chromosome Combined DNA INDEX System (CODIS) DNA DNA phenotyping DNA profile (fingerprint) DNA profiling Electrophoresis Exon Familial searching Forensic genealogy			

Gene  
 Human genome  
 Homologous chromosomes  
 Intron  
 Karyotype  
 Kinship  
 Nucleotide  
 Polymer  
 Polymerase chain reaction (PCR)  
 Polymorphism  
 Primer  
 Short Tandem Repeats (STRs)  
 Single nucleotide polymorphisms (SNPs)  
 STR markers

#### **Inquiry Questions:**

##### **Factual -**

What is DNA fingerprinting?  
 What is Gel Electrophoresis?  
 What is PCR and STR?  
 What is the structure and function of DNA?

##### **Conceptual –**

How are Gel Electrophoresis, PCR, and STR used as analytical tools in crime scene investigation?  
 How can DNA be used in personal identification?  
 How do we properly collect, document, and process DNA evidence?  
 How have advances in DNA analysis contributed to faster and more reliable results in personal identification?  
 How do you extract DNA from a sample of living tissue?  
 How do you determine which suspect should be included or excluded based on a DNA profile?  
 Can your DNA be taken without your consent? If so, how?

##### **Debatable -**

What is your opinion? Does familial searching data need to be protected?

		Summative assessment	
Unit Objectives:			
Learning Activities and Experiences	Inquiry & Obtain: (LEARNING PROCESS)	Evaluate: (LEARNING PROCESS)	Communicate: (LEARNING PROCESS)
Week 1:	<b>Phenomenon:</b> In 1984, a boy named Andrew was not allowed to return to his country until his identity was proven through DNA analysis. DNA profiling notes  DNA extraction lab	Finish DNA profiling notes  DNA Gel Electrophoresis- Day 1 (Set-Up) DNA Goes to the Races and Restriction Enzyme Activity	Gel Electrophoresis Day 2 (Analyze Results)  Class Lab Discussion

Week 2:	PCR Lab Set-Up & Run- Day 1	PCR Data Analysis- Day 2 Class Lab Discussion	
Week 3:	STR Analysis Activity	Review DNA Profiling	DNA Profiling Assessment

**Resources (hyperlink to model lessons and/or resources):**

- Textbook Forensic Science Bertino & Bertino, 3rd Edition
- Forensic Science Schoology Course
- Additional resources can be found in the common Schoology group under the Unit 5 folder.

**Reflection: Considering the planning, process and impact of the inquiry**

Prior to teaching the unit	During teaching	After teaching the unit
We may need scaffolding and extension activities as some students may remember the information well from Biology and some may not remember at all.	(click here)	(click here)