

<b>Grade &amp; Course:</b> 11th/12th Grade Forensic Science		<b>Topic:</b> Unit 9 Forensic Entomology	<b>Duration:</b> 2 weeks
<b>Teachers:</b> Forensic PLC Teachers			
<b>Georgia Standards and Content:</b> SFS5. Obtain, evaluate, and communicate information to Medicolegal Death Investigations. d. Analyze and interpret entomological data to evaluate the role insects play in decomposition and determining PMI.			
<b>Narrative / Background Information</b>			
<b>Prior Student Knowledge: (REFLECTION – PRIOR TO TEACHING THE UNIT)</b> This unit comes at the end of the Forensic Science Course. Students should be familiar with collecting crime scene samples and how to work a crime scene as well as how to collect biological evidence.			
<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> A badly burned body of an unidentified person was found in the woods in Mexico. The only tissue remaining was a piece of burned liver that could not be analyzed for DNA. Maggots were found feeding on human tissue at the crime scene. From this they were able to identify the identity of the victim.			
<b>Inquiry Statement:</b> By studying the insect population and the developing larval stages, forensics scientists can estimate the postmortem index.			
<b>Global Context:</b> Scientific and Technological Innovation			
<b>Science &amp; Engineering Practices:</b> <ul style="list-style-type: none"><li>Analyze and Interpret Data</li></ul>	<b>Disciplinary Core Ideas: (KNOWLEDGE &amp; SKILLS)</b> <ul style="list-style-type: none"><li>History of forensic Entomology</li><li>Characteristics of Forensic Entomology</li><li>Processing a crime scene for insect evidence</li><li>Forensic analysis of insect evidence.</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>Change</li><li>Patterns</li></ul>	
<b>Possible Preconceptions/Misconceptions: (REFLECTION – PRIOR TO TEACHING THE UNIT)</b> -Students may not know that maggots are fly larvae. Students may think that maggots are an unwanted pest when in reality they can be beneficial by eating dead and decaying matter. For example, world war II soldiers were more likely to survive if they had maggots in their wounds. <b>Key Vocabulary: (KNOWLEDGE &amp; SKILLS)</b> -Accumulated degree hours (ADH) -Complete metamorphosis -Crop -Entomology -Exoskeleton -Forensic entomology -Grub -Insect succession -Instar			

- Larva
- Maggot
- Oviposition
- Postmortem interval
- Ptilium
- Pupa
- Spiracles

#### **Inquiry Questions:**

##### **Factual -**

- Where do maggots come from?
- What are the life stages of a blowfly?
- What are the physical characteristics of the various stages of insect development?

##### **Conceptual –**

- How can insects be used to determine time of death?
- What environmental factors affect insect presence and development?
- How are insects beneficial to the clean up of dead matter?
- Are flies the only insects that are attracted to dead tissue?
- What are the limitations to using insects to determine time of death?

##### **Debatable -**

- Is entomological evidence sufficient and reliable enough to convict for murder?

#### **Summative assessment**

#### **Unit Objectives:**

<b>Learning Activities and Experiences</b>	<b>Inquiry &amp; Obtain: (LEARNING PROCESS)</b>	<b>Evaluate: (LEARNING PROCESS)</b>	<b>Communicate: (LEARNING PROCESS)</b>
<b>Week 1:</b>	<p>Phenomenon: A badly burned body of an unidentified person was found in the woods in Mexico. The only tissue remaining was a piece of burned liver that could not be analyzed for DNA. Maggots were found feeding on human tissue at the crime scene. From this they were able to identify the identity of the victim.</p> <p>Forensic Entomology Notes</p> <p>LAB DAY 1:  <ul style="list-style-type: none"> <li>Decay of tissue (beef liver) with insect identification (Students set-up lab outside)</li> </ul> </p>	<p>LAB DAY 2: Collect Data, process data in classroom</p> <p>Work on Decomposition Poster</p>	<p>LAB DAY 3: Collect Data, process in classroom</p> <p>Finish Decomposition Poster</p>

	<ul style="list-style-type: none"> <li>Introduce Decomposition Poster</li> </ul>		
<b>Week 2:</b>	<p>LAB DAY 4: Collect Data, Analyze, graph, and conclude</p> <p>Of Maggots and Murder Lab (Day 1)</p>	<p>Of Maggots and Murder Lab (Day 2)</p> <p>Review Forensic Entomology and take closer lab quiz</p>	
<b>Resources (hyperlink to model lessons and/or resources):</b> <ul style="list-style-type: none"> <li>Textbook Forensic Science Bertino &amp; Bertino, 3rd Edition</li> <li>Forensic Science Schoology Course</li> <li>Additional resources can be found in the common Schoology group under the Unit 9 folder.</li> </ul>			
<b>Reflection: Considering the planning, process and impact of the inquiry</b>			
Prior to teaching the unit		During teaching	After teaching the unit
<p>An outdoor space open to the elements and away from foot traffic is required to do the Forensic Entomology lab investigation.</p> <p>Beef liver is the meat of choice for the lab but can be swapped out for other available meat if beef liver is not available. Beef liver can be purchased frozen from Kroger.</p> <p>Need to make administration aware if leaving classroom and aware that rotting meat will be on school grounds as part of a forensic lab activity and should not be cleaned up by maintenance staff.</p> <p>Secure stereo microscopes for maggot examination.</p> <p>Need a better mouse trap for maggot collection.</p> <p>Animals were able to take the meat out of the cages, so look into cages with smaller holes.</p>			