

Title: Mosquitoes – More than just a Pest!

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Abstract - Taking high school students into the world of pathogens spread by Mosquitoes through a unit of study that will expose them to several pathogens spread by mosquitoes and techniques used in labs to identify these pathogens. Going back in time to Yellow Fever epidemic and the effect it had on Florida and United States until the vector was identified and preventions put into place. Current times bring new threats of pathogens coming from other parts of the world to Florida and students began crime scene investigators that try to solve a mystery of Cattle dying in South Florida that may have been spread by a Graduate Student who traveled to Africa. Students will run ELISA test and PCR to identify pathogen and patients that have are carrying DNA virus. Applying the information and techniques they will educate the public through Advertisements of prevention methods that need to be done to prevent the spread of the current epidemic of Dengue virus from Key West to the rest of the state.

Rational- Florida is an ideal breeding ground for mosquitoes year around. The threat of viral pathogens passing from human to mosquitoes and on to other humans puts at risk for illness spread to occur at a rapid rate. Awareness about the historical significance of yellow fever epidemic in Florida and the United States spread by mosquitoes will help students understand the gain in science and preventions that have occurred. The possibility of new threats with globalization and continued travel around the world by numerous residents of the state of Florida provide the chance to return with a pathogen is threat to livestock and humans.

Description of Teaching Unit - Students will learn about the history of The Yellow Fever Epidemic in the late 1880's in Florida and how it came to Gainesville. They will read primary sources from newspapers, CDC and other fact files (some not as factual- excerpts from fiction books) about the epidemic and the panic, lack of treatment and knowledge of source of infections. This research will be in jigsaw groups that will share knowledge with other groups to try to discover what was the cause of a epidemic that no one understood. Once the facts and pieces of the puzzles have been put together they will reveal that it took nearly 100 years to discover the true cause. They will then create a Cartoon story through Comic life depicted the historical significance of Yellow fever and threat Mosquitoes presented.

The study of mosquitoes their life cycle, their environments and their variety of species will begin with students collecting samples of wiggly water from their homes. They will work in rotating centers to research and learn about the mosquitoes as we continue to observe the hatcheries and make slides to try to determine the species we have present. They will use the cards order from Dr. Connelly to determine the species and the threats they may pose to locals. Students individually will be presented with a Challenge- They have just discovered what they believe is a new species of mosquito. They will determine a Name, Scientific Name, Flight range, Feeding times, How and where it will choose to go through life cycle, area it can be located in state or world, disease that it may carry or spread, additional

information. They will diagram their species. They will present them to small groups in the class and they will be displayed for all to read.

We will then visit Dr. Clark's lab for a tour and involvement with scientist who are currently working on mosquito research.

Students will then be introduced to a Scenario – Mystery in the Pasture – taken from Dr. Gibbs scenario. They will take on different roles in the state to solve the mystery. Each day they will be presented with new clues and pieces to the puzzle. They will have new “primary source” documents and access to research through Web quest. They will become the experts. As the scenario is playing out students will be asked to run an ELISA test (recreated) on the calves that have recently died to look for antibodies to the known viruses to see possible cause of death why they wait for autopsy results. After concluding it is Rift Valley Fever they will begin looking for culprits – sources of mosquito breeding in the area. Students will go home and look for wiggly water and bring in samples. We will establish hatcheries in the classroom and study the specimens under microscope. Students will keep track of different species collected and create EXCEL graphs to display data. They will begin to look at suspects, ill patients to test their blood they will run EGEL to test for the DNA present of the virus in several ill patients and suspects. They will find out who may have been the carrier through the test who has the illness. Students will learn more about how viruses and pathogens can cause a Pandemic through globized travel and current information about the exposure of certain viruses around the world. We will have guest speakers from EPI about the prevention of spreading through vaccines.

Lastly students will learn about new cases of Dengue virus that is affecting Key West and neighboring Marion County. They will talk about how to prevent the spread of a new threat through mosquitoes that does not have a vaccine for the illness. They will work as different “home teams –representing counties” that will have different specialist in each team. Health Department Representative, Family member of infected Patient, Tourism Board Member, and Environmentalist. These specialist will work together from the different home teams to research about Dengue Fever and take their knowledge back to their group. Public awareness will become the goal of this part of the unit to help spread the word about water sources that may provide homes to mosquitoes. Each group will be given a different scenario that will need to create a Short Advertisement (90 seconds) to use on local TV stations to help others become aware and prevent the spread.

Data Collection – Pre and Post Test, Performance Based Assessment - Comic Life story, EXCEL data collection of species & number of mosquitoes

Journals and Presentation to teach awareness to public of prevention methods in current times to limit spread (during different scenarios provided to groups- ie rural areas, after a hurricane...)

Equipment lockers and UF visits – ELISA simulation from Dr. Lawrence, EGels locker, Mosquito hatchery locker (coming soon),

UF visit- Field trip to Dr. Clark's lab with students from HHS to study Mosquitoes and EGELS (maybe)
Teacher Workshop in January for Teachers in Alachua County and possibly some from Marion on
Teacher workday – They will run through the unit and test all the labs at ICBR.

ICore summer elements – Mosquitoes – Dr. Clark, Dr. Connelley, Veterinary Science and Florida
Scenario – Dr. Gibbs, ELISA test, EGELS- DNA test, Cuc Tran – EPI vaccines

Literature cited

Bird, Brain. Rift Valley fever Virus. *Vet Med Today*. JAVMA, Vol 234, No 7, April 2009. 883-893.

Burns, James. How Yellow Fever Once Affected the Mail **National Postal Museum**
http://www.postalmuseum.si.edu/resources/6a2v_yellowfever.html

Centers for Disease Control and Prevention. Yellow Fever.
<http://www.cdc.gov/ncidod/dvbid/yellowfever/>

Cowart, John. Yellow Jack in Jacksonville The 1888 Epidemic.
<http://www.cowart.info/Florida%20History/YellowJack/YellowJack.htm>

Common Mosquitoes of Florida – Identification Cards – University of Florida

Integrated Pest Management for Mosquito Control, The Basics, University of Florida

Crosby, Molly. *The American Plague*.

Fairlie, Maragret. The Yellow Fever Epidemic of 1888 in Jacksonville.
<http://www.jstor.org/pss/30138360>

Jurmain, Suzanne. *The Secret of the Yellow Death*.

New York Times. TheYellow Fever **Appearance as an Epidemic in Florida Seven Deaths in Twenty Cases
Panic Among the Citizens. Decrease of Yellow Fever in Charleston, S.C. The History of Pearls How to
Select Them.**

<http://query.nytimes.com/gst/abstract.html?res=FA0714FA3A5A1B7493C2AB1782D85F458784F9>

University of Florida – Medical Entomology Lab - <http://fmel.ifas.ufl.edu>

Viral Outbreak The Science of Emerging Disease, Howard Hughes Medical Institute, December 2010

What You Need to know about Infectious Disease, National Academy of Sciences,

Yellow Fever Immunity Card. Florida Archives.

<http://www.floridamemory.com/Exhibits/medicine/documents/medicine.cfm?DOC=37>

Yellow Jack – Yellow Fever in St. Augustine. <http://www.augustine.com/history/old-st-augustine/yellow-fever.php>

Budget and justification -

<i>Mosquito breeders -about \$10 each – need 10 - (still have not been able to locate)</i>	<i>\$100</i>
Would like to set up a Locker to be checked out by Alachua County Teachers -	
need to locate final cost for ELISA simulator, UV lights, EGels	borrowed from CPET
Mosquitoes, Identification Cards from UF IFAS lab	10 each x 6 = 60
Yellow Fever 28 copies	195.72
(working on grant for books currently)	
Field Trip to Dr. Clark’s lab for 30 students	(included in grant)
	Total = \$355.72

Will be seeking other funding from Alachua County Foundation Grant and Other Sources

Stage 1: Identifying Desired Results

Ginger Stanford

Unit Title – Mosquitoes – More Than Just a Pest

Audience – High School Biology or Environmental Students

Grade level – 10-12th grade

Content – Pathogens carried by Insects that become part of human DNA

Florida State Standards –

LA.910.5.2.1 The student will select and use appropriate listening strategies according to the intended purpose (e.g., solving problems, interpreting and evaluating the techniques and intent of a presentation);

LA.910.5.2.2 The student will research and organize information for oral communication appropriate for the occasion, audience, and purpose (e.g., class discussions, entertaining, informative, persuasive, or technical presentations);

LA.910.5.2.5 The student will research and organize information that integrates appropriate media into presentations for oral communication (e.g., digital presentations, charts, photos, primary sources, webcasts).

LA.1112.6.1.2 The student will analyze the structure and format (e.g., diagrams, graphics, fonts) of functional workplace consumer, or technical documents; and

LA.1112.1.7.1 The student will use background knowledge of subject and related content areas, prereading strategies (e.g., previewing, discussing, generating questions), text features, and text structure to make and confirm complex predictions of content, purpose, and organization of a reading selection;

LA.1112.1.7.3 The student will determine the main idea or essential message in grade-level or higher texts through inferring, paraphrasing, summarizing, and identifying relevant details and facts;

SC.912.L.16 A. DNA stores and transmits genetic information. Genes are sets of instructions encoded in the structure of DNA.

SC.912.L.16 B. Genetic information is passed from generation to generation by DNA in all organisms and accounts for similarities in related individuals

SC.912.L.16 C. Manipulation of DNA in organisms has led to commercial production of biological molecules on a large scale and genetically modified organisms.

SC.912.L.16 - D. Reproduction is characteristic of living things and is essential for the survival of species.

SC.912.L.17 C. Human activities and natural events can have profound effects on populations, biodiversity and ecosystem processes.

SC.912.L.17 A. The distribution and abundance of organisms is determined by the interactions between organisms, and between organisms and the non-living environment.

SC.912.N.1 B: The processes of science frequently do not correspond to the traditional portrayal of "the scientific method."

SC.912.N.2 B: Scientific knowledge is durable and robust, but open to change

SC.912.N.2 C: Because science is based on empirical evidence it strives for objectivity, but as it is a human endeavor the processes, methods, and knowledge of science include subjectivity, as well as creativity and discovery.

SC.912.N.4- As tomorrow's citizens, students should be able to identify issues about which society could provide input, formulate scientifically investigable questions about those issues, construct investigations of their questions, collect and evaluate data from their investigations, and develop scientific recommendations based upon their findings.

The student learning objectives for the unit

1. Students will interpret articles and historical document on yellow fever to be able to list the causes, effects, solutions and misunderstanding that occurred during the Florida epidemic in 1880's. (LA.1112.1.7.1, LA.1112.1.7.3, SC.912.N.2 B, SC.912.L.16 B, SC.912.N.4, SC.912.N.4, LA.1112.6.1.2,)

2. Students will discuss in groups their findings from the information they will have available to their groups. (LA.910.5.2.1, LA.910.5.2.2, LA.1112.1.7.3, LA.910.5.2.5)

3. Students will illustrate using Comic Life their interpretation of the cause of Yellow Fever and the historical significance. (SC.912.N.4, LA.910.5.2.2, LA.1112.1.7.3)

4. Students will be able to sequence the course of events that allow a mosquito to acquire and spread to other victims viruses or other pathogens through affecting DNA. (SC.912.N.1 B, SC.912.L.17 C, SC.912.L.17 A)

5. Students will determine the possible effects of the current Dengue outbreak in Keys and Marion County. (SC.912.L.17 C, SC.912.L.16 B, SC.912.L.17 A)

6. Students deduce that specific mosquitoes can acquire specific viruses. (SC.912.L.16 – D, SC.912.L.16 A)

7. Students will experiment on sample patients with Dengue fever and be able to identify the infected patient. (SC.912.N.1 B, SC.912.L.17 C, SC.912.L.16 A, SC.912.N.4 LA.1112.6.1.2)

8. Students will distinguish the different life cycles of the mosquito. (SC.912.L.16 – D)
9. Students will interpret the benefits of creating a vaccine to manipulate the viruses effect on DNA. (SC.912.L.16 C, SC.912.N.4)
10. Students will produce a public awareness commercial about the current Dengue fever outbreak its symptoms and preventions. (LA.910.5.2.1, LA.910.5.2.2, LA.910.5.2.5)

You also need to answer the following questions in your document:

- **What are worthy and appropriate results?**
Students can explain clearly to others the ability of certain species of mosquitoes to spread illnesses.
Students will tell how to prevent the spread by eliminating the sources of water.
Students will probe into a current outbreak and identify infected patients through accurate experimentation with “samples”.
Students will conclude through technical readings the main ideas, and infer possible solutions to problems.
- **What are the key desire leanings?**
Identify DNA antigen from antibodies present from encountering a virus.
- Paraphrase the life cycle of a virus once it enters a host.
Present a Public awareness to prevent of spreading illnesses passed by mosquitoes.
Investigate and inquire how history can give us clues to current epidemics.
- **What should students come away understanding, knowing, and able to do?**
Will predict how fear that can spread when unknown illnesses plague a place.
Will conclude how identification of the cause of the illness can calm fears and learn how to prevent.
Will assess the ability of a vector to spread an illness to others.
Be able to pipette and follow directions to an ELISA DNA test to identify victims.
- Students will explain clearly to others their interpretation of scientific readings on the history of Yellow fever.
- **What big ideas can frame all of the unit objectives?**
Life Cycle of Organisms
Phenomenon of Science in real life
DNA replication of Viruses
Communication and Verbal Skills

Stage 2 – Assessment

Explain - Mosquitoes viral spread

Acquiring of virus from source

Viral translation to be able to be passed in blood stream

Sequence insightfully the events that allow a mosquitoes to acquire and spread

a pathogen in interactive notebook notes. (Students have a rubric as the second page in their interactive notebook so they understand the requirements for a different level of points for all units of study)

Understanding

Identify water sources – beyond normal lakes and streams- containers in the yard, tires, plants, that some mosquito’s species may wait to hatch till conditions are appropriate.

Bring in photos or list of sample sources in their own backyard water sources that are allowing mosquitoes to complete life cycle. (Bonus for wiggly water – mosquito larva)

Analyze-

Inspect news releases from local sources of current outbreaks that are occurring.

Compare current outbreak to previous learned yellow fever – similarities and differences.

-Experiment samples –to determine if patient if carrying DNA for Dengue or other viruses

Compare and contrast yellow fever to Dengue fever outbreak in notebooks with a Concept Map

-Effectively completely lab to test samples and compare to DNA of virus to determine positive results.

Evaluate- Recommend possible preventions and solutions to prevent further spread of outbreak.

Create a public awareness campaign to reveal prevention of further outbreak.

Posttest -

1. What do you know about an epidemic related to a virus or illness spreading?
2. Draw a mosquito and label all the essential parts you know?
3. Describe the life cycle of a mosquito and where eggs are laid?
4. Sequence the stages of coming in contact with a virus to a person become ill and possibly transmitting to others. Including the antibodies role and antigens development.
5. What role can science play in the need to identify a cause of an illness and how can scientist share their findings.

Comic Life Rubric done in pairs

Required Components to project	Points
Town of Epidemic	/2
Minimum of six sections to comic strip	/6
Drawing are clear enough to see	/4
Dialogue flows and is easy to understand	/6
Dialogue has correct grammar	/3
Clearly communicate to someone who does not know the history of the yellow fever epidemic in Florida	/4
Total	/25

Rubric of New Mosquito Organism – Individually done

Required Components to project	Points
Name	/2
Scientific Name	/3
Feeding times	/2
How and where will it choose to go through life cycle	/5
Flight range	/2
area it can be located in state or world	/2
disease that it may carry or spread and why	/4
additional information	/2
They will diagram their species	/4
Label on diagram at least 6 vital parts for feeding and passing viruses	/6
Quality written paragraphs with good grammar	/3
Total	/35

Public Awareness Campaign Rubric – In Groups

	Points
Complete story board	___/3
Provide accurate information about the water sources that enable mosquitoes to reproduce.	___/5
Illustrate the ability of mosquitoes to infect a person with a pathogen	___/5
Effectively communicate message in less than 3 minutes.	___/3
Insightful message about protecting yourself against mosquitoes bites	___/2

Sensitively cover subject matter to not offend those guilty of allowing outbreak to possibly continue due to lack of knowledge	____/2
Good grammar, complete sentences in presentation	____/3
Total	____/23

Stage 3 - Lessons

Lesson 1 – Fear Strikes America

Content Summary - Big Ideas- Phenomenon of Science in real life

The Yellow Fever Epidemic began in the United States of America in 1798 in Philadelphia and hit port cities up and down the coast. New Orleans and Florida suffered for almost a century and within short periods 15,000 died along the Gulf Coast of Florida to New Orleans in one year. As time passed it seemed that locals no longer suffered and African Americans. There was much mystery and fear for the cause of this epidemic which leads to discrimination and controlled travel. Visitors or locals in the beginning tried to escape the terror but were denied access to other cities or communities due to their possible exposure. There was many remedies that were tried but the main problem was no one was aware the cause .The winters helped end the epidemic in some cities but with year around warmth and water the Gulf areas saw little relief.

Science does not always know the immediate causes of illnesses and epidemics. This panic has happened in this century with food safety, illnesses that endanger entire species of plants and human illnesses that are unknown. The fear and panic can create dangerous situations. It took over a century for the United States to discover a cure. Dr. Walter Reed was sent to Cuba to study the illness and try to find a cure and he learned that it was the mosquitoes. This knowledge lead to prevention of contact of people with mosquitoes and ended the epidemic. We need to learn from our past.

Lesson Procedures:

Engage –

Whole Group - Students will see a short presentation on a memorial that is located in Evergreen Cemetery in Gainesville, Florida. The memorial is in honor of the two National Guard Soldiers that died after contracting Yellow Fever. The two were part of a group sent to protect Fernandina Florida from riots regarding the quarantine to protect the state.

We will discuss what students know about Yellow Fever and how it may have spread. What may have been the cause (students will have no hint yet of mosquitoes? What could have lead to such violence and chaos that a town was going to burn down? What may have caused innocent men to contract the

illness and how was it connected to the riot? How would you feel if an illness is killing your family in a short period of time and you have no idea what was causing it?

We will make a chart of what students Know and what they wonder about Yellow Fever. (This will serve as a pre-assessment as to not give away the cause of the illness.)

Explore – I will have coordinated with the Reading Teacher and students will be beginning the story Fever 1793 which will add to the level of discussion in our class as well.

In Science class small groups of four students will be given patients cases who suffered from yellow fever. They will have some artifacts – newspapers, letters, from the time periods of 1793-1890 when yellow fever was at its peak in the United States. Students will read through cases and artifacts while taking notes of important clues in their interactive notebook. Their group will have to write up a hypothesis for the possible cause, how they will protect people and if they feel they need to try to test for confirmation – how they would go about it.

Case 1- Ernestine is 53 years old and lives near Gainesville, Florida. She has a large farm and has lots of help and family. She travels to the closet town weekly to purchase supplies and attend church. Her family raises their own food on their farm. Her symptoms came on rather quickly and she has a yellow color to her sign, her tongue is extremely red, she has fever, severe headache and is showing signs of hemorrhagic. No one in her town has had yellow fever until 2 of her workers got sick this year but Gainesville has had several cases last month too. Her family needs her and is concerned but she is not responding to their care. The closest doctor is out of town and no one knows what else to do.

Case 2 – Frances is 5 years from Jacksonville Florida and has recently been sent to Palatka to live with her aunt as she has been orphaned by the yellow fever epidemic in her hometown. They thought she was fine when they put her on the train but she has been in bed for 3 days since she arrived with fever and headache. Her aunt called a doctor not sure if she was ill with grief but he confirms it is yellow fever and that everyone needs to take caution and isolate her. She seems to be gaining a little strength and the doctor feels that most children tend to live and that she may make it.

Case 3 – Solomon is 22 years old and lives in the central of Florida near the Kissimmee River. His family lives mostly in isolation except the occasional boat that passes on the river or a surprise guest that finds their home while traveling. His only recent contact to other people was a trip to the General Store about 35 miles away up river. He made the trip in two days with horse and buggy and stayed overnight in the woods. His symptoms are aches, fever, headache, yellowing of skin and eyes, redness that is abnormal to tongue. The nearest doctor probably will not make it in time to help him. The family has put him in isolation hoping to spare the rest of the family but his young bother seems to be showing signs.

Case 4 – Ben is 9 years old and lives in south Florida where most do not venture due to the thick jungle and high mosquito populations. His mother is a Seminole Indian who lives with her family and others Seminoles hiding from being forced out West in the Trail of tears. His father lives farther north he is a white man who is friends with the Seminoles. His illness is something the group has not seen anyone

suffer from, the tribe medicine man has tried several treatments before getting the right one to help him. His symptoms included chills, fever, headache, and yellowing of the whites of his eyes.

Explain- In Whole group we will discuss their hypothesis for the cause of yellow fever. Students will share the clues they uncovered that lead to their final decision.

In a brief Smart board lesson I will show the students a few additional clues that were discovered in some areas that helped lead to the hypothesis of the group.

The class will see a 3:05 minute movie segment from Discovery Education – “Yellow Fever Plagues the US. “

After the movie the clips in their original group’s students will discuss the significance of over 100 years of not knowing the cause and how this may have lead to more deaths. How does finding a cure change the history of Yellow Fever in the United States? They will note their discussions in a paragraph summary of what they learned about the illness, the symptoms, the cause and the prevention.

Elaborate - Students in pairs will prepare a Comic Strip story to tell what a town in Florida may have been going through during the Yellow Fever. They will create all images by drawing them and snapping them with camera on laptop. They will design and write dialogue to help translate the period of unknowing and sadness. What role science could have played in helping those that were sick or prevent the spread of the illness?

Extend – Students will have a guest speaker from the College of Medicine on Vaccination and how important it was to be able to know the cause of Yellow Fever and other illnesses but also to be able to control through vaccinations the spread virus borne disease. (I have put out a request from ACPS to locate a speaker three came back as good resources and able to relate to students, just have to contact)

Materials - Comic Life software, Laptop cart, Readings from Internet printed and prepared for the groups, Patient cases provided to groups

Assessment

KWL

Comic Life – assessment of student’s comprehension and ability to illustrate their cause for Yellow fever and historical significance of not knowing.

Differentiated Instruction Strategies Used:

Students will be matched with a reading buddy who will help read through the documents they will receive in groups. The reading buddies will work together on the final project for this lesson of Comic Life.

For the pretest I will encourage pictures and drawings for students who struggle writing. I do encourage complete sentences but understand that some students will be challenged by this request and still expect they tell me as much as they can in the form that works for them and their abilities.

Works Cited/Resources-

Alachua County Library District Heritage Collection <http://heritage.acl.d.lib.fl.us/1301-1350/1325.html>

Arnebeck, B. Short History of Yellow Fever in the US. <http://bobarnebeck.com/history.html>

Anderson, L. (2000) *Fever 1793*. Simon & Schuster.

Augustine.com. *Yellow Jack*. <http://www.augustine.com/history/old-st-augustine/yellow-fever.php>

Center For Disease Control. Yellow Fever Prevention.
http://www.cdc.gov/ncidod/dvbid/yellowfever/YF_Prevention.html

Cowart, J. (2005) Yellow Jack in Jacksonville The 1888 Epidemic.
<http://www.cowart.info/Florida%20History/YellowJack/YellowJack.htm>

Discovery Education. “20th Century Turning Points 1900-1907” segment clip “Yellow Fever Plagues the United States.”

Florida Memory. State Libraries an Archieves of Florida. Warning of the Immnent Threat of a Leprosy Epidemic. <http://www.floridamemory.com/Exhibits/medicine/documents/medicine.cfm?DOC=39>

Florida Memory. State Libraries an Archieves of Florida. *Yellow Fever Immunity Card*.
<http://www.floridamemory.com/Exhibits/medicine/documents/medicine.cfm?DOC=37>

Fairlie, M. *Yellow Fever Epidemic of 1888 in Jacksonville*. <http://www.jstor.org/pss/30138360>

Memphis History.com. Yellow Fever.
<http://www.memphishistory.org/Events/YellowFever/tabid/370/Default.aspx>

National Postal Museum. *How Yellow Fever Once Affected the Mail*.
http://www.postalmuseum.si.edu/resources/6a2v_yellowfever.html

PubMed Health. (2009) *Yellow Fever*. <http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0002341/>

Wall, J. (1867) As to Yellow Fever. Florida Memory. State Libraries an Archieves of Florida.
<http://www.floridamemory.com/exhibits/medicine/documents/medicine.cfm?DOC=2>

Lesson 2 – Mosquitoes –Life Cycle when are they able to pass Viruses.

Content Summary- Students will have the opportunity to work on the Big Ideas of Life Cycle of Organisms, Anatomy of Macro Organisms and DNA and Viruses. They will study these through mosquitoes – their life cycle, where they lay eggs (anywhere there is standing water- tire, planters, cut bamboo, bromeliads, creeks, and lakes, on the dry ground waiting for water), larva and pupae and adult stages. In adult stage feeding that allows them to be able to reproduce feeding every 3 to 4 days on

blood from a host organism and a typical life span (3 to 6 weeks). The lack of adults ability to pass on viruses to eggs and how viruses are acquired by biting a host (human or animal) that carries the virus (has been infected long enough as a host to pass on to mosquito) and allowing the mosquito the 3 to 5 days to make its own virus DNA that it can pass on to another Host and the cycle continues. (Antibodies and virus being acquired in human body and antigens will be discussed in a separate lesson)

It is also necessary to add a component about how to prevent the places for eggs to be laid by mosquitoes and the variety of species that choose certain locations. Some species are able to carry some viruses and other not. Some mosquitoes bite only reptiles, some feed on only birds and some on humans. A virus can rarely be spread from one animal host to humans through mosquitoes. But Eastern Equine Encephalitis virus is one that can pass from horses to humans through mosquitoes. There are other viruses that mosquitoes cannot acquire and pass from host to host like AIDS, Flu and Chicken Pox. Prevention through pesticide and repellants will be investigated and explored in a field trip to culminate the lesson.

Lesson Procedures:

Engage – The previous day students were encouraged to go home and locate ‘wiggly water’ in and around their homes and bring in samples. I would like them to take photos and email me of where they located that I can incorporate in class presentation.

We will make a list of locations students were apply to locate wiggly water. We will make a list of other places that we may be able to locate.

I will introduce a few species of Mosquito that are unique about where they will lay their eggs. I will show some pictures of Indian River area, that has some of the highest population of mosquitoes in Florida, where the eggs laid in the marshes look like oil slicks from above. Students will be encouraged to go home and look for some of the other locations they may not have looked.

They will then create an ongoing list of questions that help me model for them the thinking process behind research and how we create researchable questions. These questions will be added to daily (this will continue in Explore and Explain)

Explore- Students will place some of the wiggly water in mosquito hatchery containers, that will allow mosquitoes to develop and be observed. Students will observe mosquito in egg, larva and pupae stages under microscope daily depending on what is available. It will take 3 to 5 days of development to hatch all into adults. (While we are waiting we have further activities in this lesson listed below)

As adult mosquitoes fly up into the top of the container students will collect them. They will make slides that will be used for students to compare look up and determine the species using the UF Database (listed in Resources)

While waiting the few days for mosquitoes to go through life cycle students will explore UF website to locate information about different Mosquito species, myths about how to get rid of mosquitoes, how they spread viruses and the viruses that they can spread. They will also have access to several books about Mosquitoes that will be available. To guide students they will refer to question list that they class has created and has been adding to daily.

Explain – Each day students will rotate through their stations in groups (each day they should be able to spend time at each one) – Observe Larva Station, Adult Mosquito Station, research on computers, and research in books, discussion station.

This will allow me to observe and have time to meet with each group about their progress. Discuss their findings and questions they developing. It will allow me to check Interactive Notebooks and assess daily their progress. I will be able to allow students to explain findings to each other and model further research skills and how group discussion should flow. I will be able to bring in additional information as necessary but will try to use the policy to encourage with more questions so they will naturally want to seek more on their own and take ownership for their learning.

Elaborate – Students individually will be presented with a Challenge- They have just discovered what they believe is a new species of mosquito. They will determine a Name, Scientific Name, Flight range, Feeding times, How and where it will choose to go through life cycle, area it can be located in state or world, disease that it may carry or spread, additional information. They will diagram their species. They will present them to small groups in the class and they will be displayed for all to read. (They will have a rubric ahead to know expectations and requirements. – This will be begun in class but completed for homework - 2 days due after field trip)

Extend - Field trip to University of Florida, Dr. Gary Clarke, USDA lab that researches mosquitoes, repellants, affects on animals, fish, reptiles and prevention. This trip will be one day and students will have opportunity to meet real scientist in the field working on these organisms. They will be able to observe labs, tour and ask questions. We will see the consumer side of science through the USDA, whose focus is on the ability to sell products that will be consumed or interfere with the consumption of foods.

Materials –Mosquito Hatcheries, containers for students to collect samples, microscopes, slides, School Bus, Permission slips, PowerPoint, Research books on Mosquitoes, Identification Cards from UF IFAS lab, cameras or cell phones (students that have will use).

Assessment-

Reflection in Journals - Students will diagram the life cycle of mosquitoes in their journals. They will take notes of the process they observed under the microscope. They will also list possible locations that they would be able to locate wiggly water and why different species would want to place eggs in different locations for species survival.

Interactive Notebooks – Students will note information they located related to the BIG IDEA we are exploring – Life Cycle of Organisms, Anatomy of Macro organisms and Viruses (DNA's help in spreading viruses).Students will take notes from exploring websites, group discussions and class discussions. (These notes will be used to help students for later lessons) The Esstential Question focus at the beginning of class will remind them what they should be noting in their notebooks.

Not every day but at least once or twice in the 7 days I will ask students to complete a Exit Slip to an Absent Students what they learned about today. This will serve as an additional check.

New Mosquito Species – Graded with Rubric (located in Stage 2 of Unit).

Differentiated Instruction Strategies Used:

Students will be working in research groups that will match students of similar reading levels together. This is unusual but will allow me to model more appropriately to the level the students should be working at. They will also allow me to support them as needed and they will have books of various levels available at research time. The lower group will be provided with suggestions of where to locate information as needed (I do not believe in providing it before they need it as they may not need it , but I also believe they should not be pushed to frustration point.)

Works Cited/Resources-

Baldwin, Rebecca. University of Florida. Entomology Lab.

Clark, Gary. University of Florida, USDA Mosquito Lab.

Connelly, R. ,University of Florida – Florida Medical Entomology Laboratory,
<http://mosquito.ifas.ufl.edu/> (Emails, Information off Website,)

Common Mosquito Deck, Identifier, UF,
Florida Mosquito Database, U, IFAS

Coldrey, J.(1997) *Mosquito* . Silver Burnett Press.

Markle, S. (2008). *Mosquitoes the tiny troublemakers*. Lerner Publications.

Siy, A. (2006) *Mosquito Bite*. Charlesbridge Publishing.

Spielman, A. (2002) *Mosquito: The Story of Man’s Deadliest Foe*. Hyperion.

Lesson 3 – New Outbreak hits Florida

Content Summary – Big Ideas - phenomenon of science in real life,
DNA replication of viruses and communication and verbal skills.

Florida has recently been hit with a Dengue fever outbreak. This virus is commonly referred to as bone break illness, due to the symptoms of severe pain in the joints and bones. Other symptoms include fever, severe headache, rash intolerance for light (pain in and behind eyes) and hemorrhagic. It can be fatal if the symptoms go unrecognized or the victim has a weak immune system. The vector that carries the virus and spreads it between human host and mosquitoes is *Aedes aegypti*. This mosquito feeds during daytime and close to home. It is an epidemic in surrounding island countries, including Puerto Rico, near the Keys. The virus was most likely spread by an unknowing patient who visited the Caribbean and returned with the illness where he or she was bitten by a mosquito during illness (not in incubation period) and spread to mosquito who passed it on to a new host or hosts after about 3 to 5 days of acquiring. As the virus spreads to three countries through travel it is considered a pandemic and can affect people around the world. Due to our highly mobile society pandemics in food, human and animal pathogens are more and more common.

Once a human has acquired the virus it becomes part of the cells in the body and the virus DNA connects to the DNA of the cell. The body's immune system once attacked but since it is part of the cell it is more difficult and antibiotics will not work. The body must make protein antibodies in the immune system and will try get rid of the antigen (virus). When a doctor does a test they test for the antibodies present that would recognize that antibody you can have them if you currently have the illness or if you have ever had it. Another way you may carry the antibodies is if you have had a vaccine to the illness. Enzyme-linked immunosorbent assay (ELISA) test which tests for the presence of antibodies or antigen in samples.

It is important that students help diagnose a patient with symptoms of the virus, learn about the virus and help prevent a spread of fear and anxiety of the unknown. Students will use information they previously learned in prior lessons to put all the pieces together and create their final assessment product.

Lesson Procedures:

Engage students – With a News clip – Dengue Fever has hit South Florida, the fear is that it will spread. Create a need to learn more, urgency it is close (in their state), real and has different symptoms and is different than Yellow Fever.

Explore – Students will be assigned to Home Teams (which will have names of local counties – Alachua, Broward, Hillsborough, Duval, and Okeechobee) that will work to learn more about the threat and how to prevent it coming to their area. Each member of the team will have a role- Health Department Representative, Family member of infected Patient, Tourism Board Member, and Environmentalist.

Each Home Team will Jigsaw into their role groups to begin the research. The Role group will create at least 5 to 7 questions they feel they need to have answered in their role to be able to help their home team. They will be allowed to search the internet to answer their questions (I will create a web questionnaire to do at home this summer – but sites list in resources). Once they have located their answers and discussed to make sure everyone **understands** and can translate to their Home Team. They will leave having used their whole brain to create complete sentence notes and illustrations to explain.

My role will be to check on the Jigsaw groups and make sure they have no questions that they are unable to answer and if they are taking notes and key points down in their interactive notebook.

Explain- Back in their Home Teams students will be sharing the keys pieces of information that they have acquired. Their team will receive a Rubric that outlines the key pieces of information that they will need to include in their commercial.

We will have a class decision about findings and new vocabulary that we discovered in their readings and answer together as a class remaining questions. (I am a facilitator in this role and even though I have knowledge it must come from the students. I can guide and probe further but they are the experts.)

Elaborate- Students will go back to their Home Teams and they will find out that a case has just been identified in Marion County. I will show newspaper clip (in resources) and we will discuss. There has been several patients that doctors are now concerned about due when they previously thought the patients were suffering from the flu. The hospitals have ordered test and for two patients to try to confirm the possible cause of their illness. These samples have just arrived and we will need to test them in the lab.

Before we can begin we will discuss as a class any information they were able to locate in their expert groups about how viruses affect the body and how the body fights the illness. What are antibodies and how they work? After the discussion, each group will be presented the patient backgrounds. They will test using an ELISA test of a 96 well plate with samples from the patients against a sample of Dengue fever to see if the patient is positive for the antigen.

Patients and their case studies-

Billy Jo Cruise – A Salesman. Has recently returned from a trip to Miami- Dade where he was on a business trip. His company took the group on a fishing trip to the island of Islamorada. His symptoms are fever, rash and body ache. He says that he is sensitive to light and wants to stay indoors the last few days.

Mary Kay Moore – A Teacher. Mary recently returned from her family vacation and has not felt well. She visited Silver River State Park in Marion County for a week of canoeing and hiking. She is naturalist and loves the outdoors. Her symptoms include exhaustion, achy muscles and joints. She seems to have no fever currently but not sure if she ran one the last few days.

Ray Saunders- A Electrician. Has been busy lately with his church reunion and had a huge picnic to celebrate the 100th year of the church. He said the picnic was outdoors and hotter than normal for November but he has done nothing else except go to work lately. His symptoms are fever, rash that appears like bruises under his skin, and achiness. He is unable to work the last two days because he does

not feel good.

Extend-Students in Home Team groups will put together a story plan and of a Public Awareness Commercial that will be no more than three minutes in length. Students will be provided the rubric of required elements and will plan, tape, edit and then showcase their commercial to the class.

Materials -

Jigsaw group roles- prepared slips

Reading articles printed and cut if necessary for each Role Group

Guide Questions for the Home Jigsaw Teams – to guide decision

Rubric for Comic Life Project – What is expected so groups can make sure they are prepared to meet expectations.

laptop cart

Assessment

Interactive Notebooks – Evidence of gathering and manipulating content provided in readings, websites and videos to comprehend the main ideas, and

Lab – Are they able to follow the directions for the lab and identify the correct patient with the antigen. The Billy Jo has food borne illnesses, Mary Kay has Lyme disease and Ray should have test positive for the antigen.

- Final Project – Commercial – Public Awareness (Rubric in Stage 2)

Post Assessment test

Differentiated Instruction Strategies Used: For this lesson students will be divided into home teams that will have diverse levels of readers. The Home Teams will have higher and lower level students. The roles will be assigned to students to be able to make sure that all lower students are not Health Department Representatives. This will ensure that in the Role Groups they will also have higher and lower students. Individual accountability will be help ensure that students cannot just do it for other students. They will need to take back knowledge, usable information for their students.

For the pretest I will encourage pictures and drawings for students who struggle writing. I do encourage complete sentences but understand that some students will be challenged by this request and still expect they tell me as much as they can in the form that works for them and their abilities.

Works Cited/Resources

ABC News - <http://abcnews.go.com/WNT/video/dengue-fever-tropical-disease-hits-us-11283802>

Center for Disease Control - <http://www.cdc.gov/>

CNN Health - <http://www.cnn.com/2010/HEALTH/08/03/dengue.virus.florida/index.html>

Florida Keys – “Key West Seeks prevent dengue fever”

<http://www.miamiherald.com/2011/05/17/2221525/key-west-seeks-to-prevent-dengue.html>

Flu Attack ! How a Virus invades your body (this may not be dengue but it tells how viruses invade)

<http://www.youtube.com/watch?v=Rpi0emEGShQ>

Ocala. Com – Dengue Fever located in the county -

<http://www.ocala.com/article/20100715/ARTICLES/100719834>

WPTV -News channel 5 <http://www.wptv.com/dpp/news/denque-fever-concern-after-cases-confirmed-in-key-west>