Mosquito Investigation Notebook

Name: _____

Start date: _____ **End date**_____

Foreword

The **Mosquito Investigation Notebook** is intentionally designed to reflect basic aspects of a science notebook while also incorporating information and activities that build relevant background knowledge, confidence in independent learning and research, and engagement in science.

This resource is dynamic- meaning your **Mosquito Notebook** will grow as you complete more activities, use the GLOBE Observer app, and the Mosquito Habitat Mapper tool (MHM), and engage in creating your investigations. Check the GLOBE observer website (www.observer.globe.gov) and click on Mosquito Habitats for additional ideas and pages to add to your notebook.

You may be spending time inside your house but will get back outside among the mosquitoes soon! So, here are two lists of related things you can do, one for indoors and one for outdoors.

While indoors:

- Complete the activities in the notebook.
- Check the GLOBE Observer website for additional content resources for your notebook. We will be adding activities and materials for you to build a stronger background in mosquito science and to prepare you for your Mosquito Habitat Mapper app research.
- Discover seven of the most common diseases transmitted to humans by mosquitoes by reading the "Beyond the Bite" guide. It can be accessed online at https://strategies.org/products/beyond-the-bite/
- Build your knowledge by reading books about mosquitoes. Here are three we would recommend:

    The Fever by Sonia Shah (adult)
    Fever 1793 by Laurie Halse Anderson, (young adult)
    Mosquitoes Don't Bite Me by Pendred Noyce (children).

More titles may be found at https://observer.globe.gov/toolkit/mosquito-habitat-mapper-toolkit/books-videos-and-presentations

When outdoors:

- Use the MHM and start gathering data on mosquito larvae. Remember, **mosquito larvae are harmless**. You will check out the habitats and hideouts in which mosquito larvae thrive. You will send your data (photographs) to GLOBE using the app AND use your **Mosquito Notebook** to jot notes, observations, and ideas for further investigations. Check the GLOBE Observer website often for more ideas.

To the parents/guardians/caregivers of mosquito researchers- we encourage you to get involved. Here are four suggestions.

1. Review notebook entries as they are completed.

2. Ask questions that begin with…" *Why do you think* ….?
    a. For example, ask: "*Why do you think that mosquitoes show up in the summer, but not in the winter*?" The child may come up with these possible answers:
        - water is frozen in winter (no place to lay eggs),
        - humans (blood source) are not outside as much/skin is not exposed as much (nothing to bite to get blood),
        - mosquitoes are cold-blooded (their body temperature is determined by air temperature), so their bodies would not function at cold temperatures)

3. Provide books on mosquitoes for the child to read. (See list above). Read the book yourself and have a "Book Club Dinner" where you discuss the book while sitting at the dinner table. (Maybe a chapter every Monday evening!)

4. Have fun being a citizen scientist along with your child.

Table of Contents:

Introduction: Mosquito Investigation Notebook

A notebook is a tool used by scientists. Both professional scientists and citizen scientists keep notebooks. As a tool, it is used to help them accomplish a task. That task almost exclusively involves solving a problem or answering a question.

So, here is your notebook.

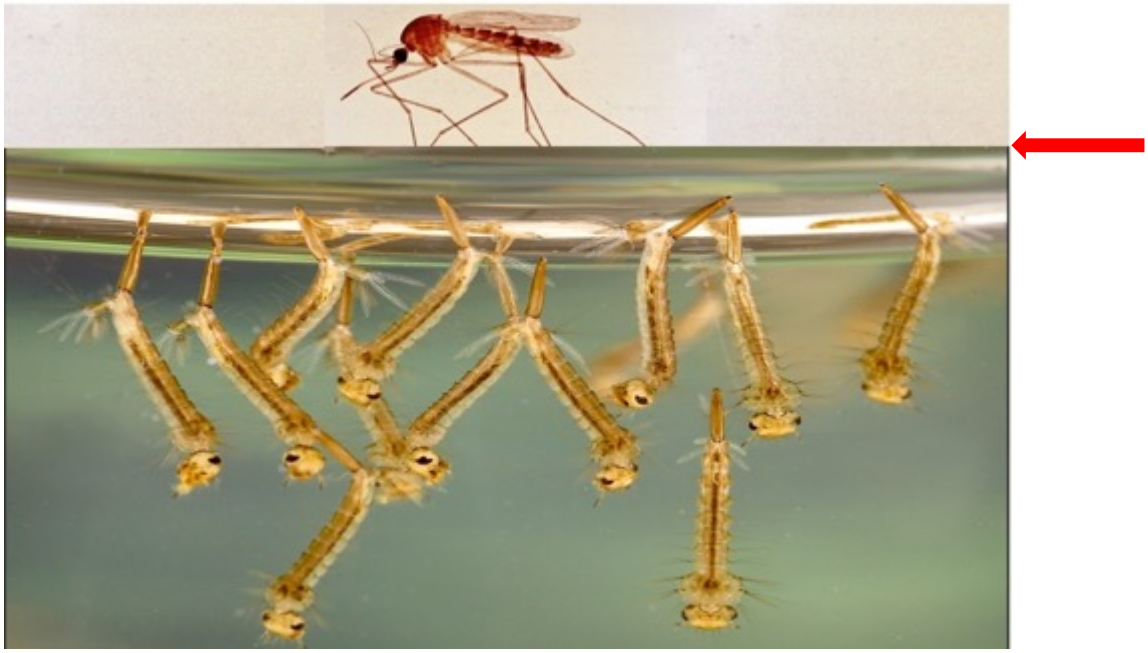
Your task is to become familiar with mosquitoes. Learning how they live, where they live, when they are active, why they bite, and how they spread diseases can help you reduce their numbers in your local environment; because mosquitoes often transmit deadly diseases to humans.

This Mosquito Notebook provides a personal space to:

- learn mosquito science
- collect relevant vocabulary
- make drawings
- generate questions
- record thoughts and ideas
- plan investigations
- record observations and data
- analyze observations and data
- construct explanations
- understand the process of science

The notebook will grow in size and importance as your work progresses. The Table of Contents has many blank spaces for you to add your pages of questions, thoughts, and investigations as you learn more. The goal is to have you begin your research with some background information on mosquitoes in the front of your notebook to refer to as you learn more. There will be many observations, investigations, and activities along the way.

Meet the Mosquito



Do you recognize the organism sitting on top of the water surface (red arrow)? (Hint: it is absolutely the deadliest creature on the planet!!)

What is the name of that organism? _____

But what are THOSE things?

But what about those strange-looking organisms hanging out below the water surface- what are those? Do you have some questions about them? What are you wondering about them? Finish the sentence starters below.

1. I wonder..._____

   _____

2. I also wonder… _____

   _____

3. What if ..._____

_____

4. Is it possible that ..._____

_____

5. This reminds me of..._____

_____

Build a Background

1. Mosquito Lifecycle

Did you know that mosquitoes go through a multistage (4 stage) life cycle?

Stage 1: The first stage is the egg.
Stage 2: The egg hatches into a wormlike stage called a larva.
Stage 3: The larva changes into a pupa.
Stage 4: The adult mosquito emerges from the pupa.

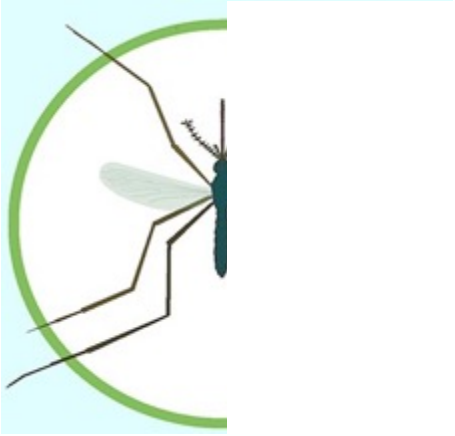
VOCAB alert:

larva: the active immature form of a mosquito that hatches from the egg. It differs greatly from the adult- it is worm-shaped. The plural form of this word is larvae.

pupa: the non-feeding stage of development in the life of a mosquito between larva and adult. It is shaped like a comma. The plural form of this word is pupae.

2. Meet an Adult Mosquito

Here is the stage that you are probably most familiar with- Stage 4: the ADULT! We will start here since it is the one with which you are probably most familiar.



But wait, only half of the mosquito is shown in the drawing above. Complete the image by drawing the other half.

Next, label the following parts on the image of the adult mosquito above: wings, antennae, mouth, and legs. The three main body sections include the head (first section), thorax (section behind the head), and abdomen (section behind the thorax).

How many wings does a mosquito have? _____

How many antennae does a mosquito have? _____

How many sections (or main body parts) does a mosquito have? _____

How many legs does a mosquito have? _____

Mosquitoes are insects. All insects have this number of these characteristics:

Antennae = _____ Body sections = _____ Legs = _____

The adult mosquito must eat. What do you think they eat? _____

_____

You might have written that all mosquitoes eat blood, but that is not true. Only some mosquitos will bite an animal to get blood. They need blood because it is important to the development of eggs. So, which mosquito gender eats blood? _____

All mosquitoes- both boys and girls- eat nectar (plant juice). Can you name any other insects eat nectar? _____

_____

Is this a picture of a male or female mosquito? _____

Explain how you know? _____

_____

3. Meet the three other life cycle stages.

Mosquitoes go through a complete metamorphosis- which includes four stages: egg, larva, pupa, adult. You just learned about the adult stage, now let's look at the other three.

As with many organisms, the **first stage** of the life cycle of a mosquito begins when an adult female lays an _____.

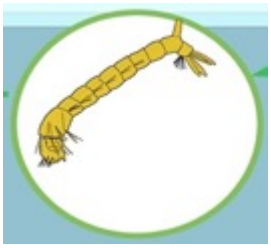
Based on the picture at the beginning of this notebook, where in the environment do you think she lays them? _____.

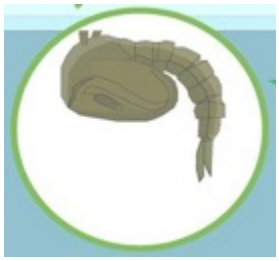
Why do you think that?

Female mosquitoes lay eggs. The eggs are laid directly in water or areas very close to a source of water that floods regularly, or on the walls of a container that holds water. She can lay up to 300 eggs at a time. Some species lay those eggs singly; some species lay them in groups that look like a raft. Regardless, mosquito eggs are very small; you would need a magnifying glass to see them.

After a few days, the eggs hatch into larvae- the second stage. You have already seen that stage in the first picture in this notebook.

After spending time (a few days) as larvae, they turn into pupae, the third stage.





On the left is a drawing of a larva (the second stage); on the right is a drawing of a pupa (the third stage).

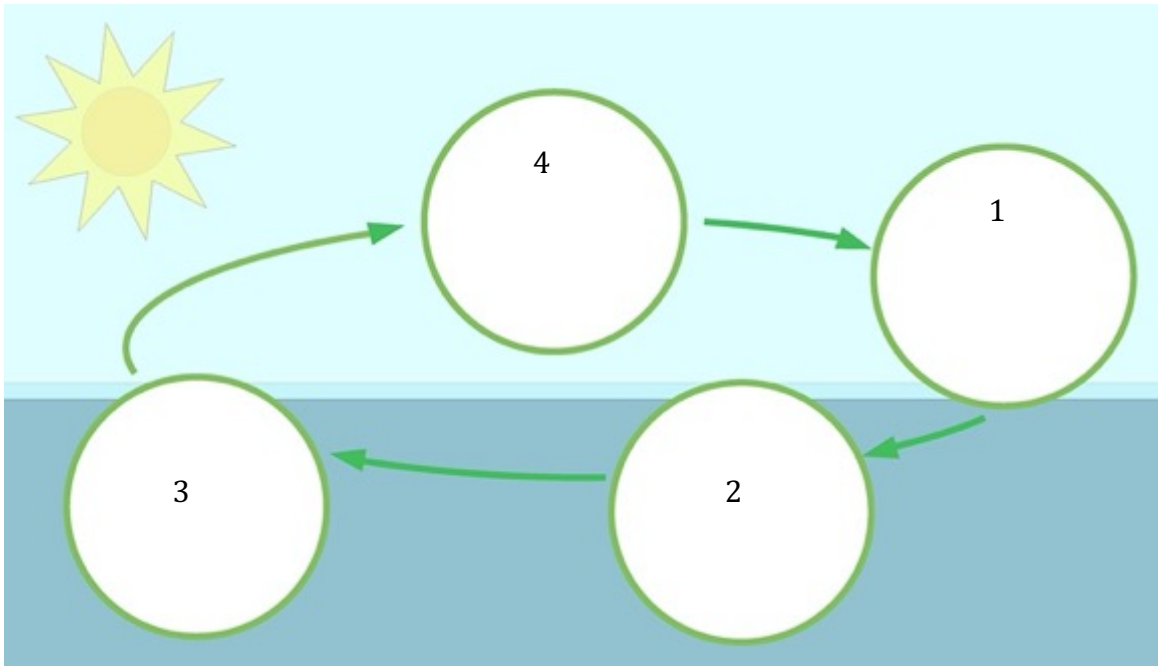
List two ways that the larva and pupa look alike:	**List two ways that the larva and pupa look different:**
1.	**1.**
2.	**2.**

Larvae need food to eat and air to breathe. They have a mouth; they eat microorganisms that live in the water around them. They breathe through a special tube called a siphon located at the other end of the wormlike body- it looks like a straw. The siphon must be at the surface of the water for the larva to get air.
After just a few days as larvae (depending on species of mosquito), they develop into pupae. Pupae also live in the water. During this stage they form the body parts that will allow them to survive in the air as an adult. They do not eat during this time.
How can they survive?

4. Putting the Life Cycle Together

The diagram below represents the mosquito life cycle- with the arrows showing the sequence of stages and the empty circles represent the actual stages. The four circles below the diagram show what the mosquito looks like in each of the four stages. But those circles at the bottom are not in the proper order of development.

Draw a line from the circles at the bottom (with the images of the mosquito) to the circle on the diagram in which you would find th**at stage of the** mosquito.



(pupa)

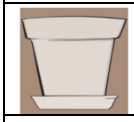
(adult)

(Larva)

(eggs)

5. Understanding the Mosquitoes' Habitat

Based on what you have learned about the life cycle of a mosquito, would you expect to find mosquito eggs (or larvae or pupae) in the following places?

Place or item	**Would you expect to find mosquitoes here?**	**Why or why not?**
		
		
		
		
		
		
		

Background Building Summary

You have learned a few basic facts about mosquitoes. You know about their life cycle, where they lay their eggs, why water sources are important to them, the three stages of their life cycle that you rarely see, which gender of mosquito bites and why, what all mosquitoes eat, and where to find them.

But your research is just beginning! What questions do you now have about mosquitoes that you would like to explore?

1.

2.

3.

4.

5.

Be sure to share the work that you've done with others, for example, parents, grandparents, and friends ….