Mosquito Larvae Hunters: Level 1 Training

Name: _____

Today's date: _____

Attention:

A personal message has just come in for you from the Training Director of the Mosquito Larvae Hunters (MLH) program. It is posted below; **please read carefully**.

Greetings!

It is my honor to invite you to join our Mosquito Larvae Hunters (MLH) team.

MLH training prepares you for important work. As you proceed through your training, you will develop skills that lead to the identification of mosquito larvae. In addition, you will apply those skills to:

- **Gather** and analyze data about where and when mosquito larvae are found
- **Monitor** local presence of mosquitoes that can serve as vectors for disease
- **Reduce** the number of mosquito breeding sites

Ultimately, those skills will support the health and safety of your family and community. Ask any badge-carrying Mosquito Larvae Hunter about their training, and they will tell you that it was challenging - but worthwhile.

Are you up for the challenge?

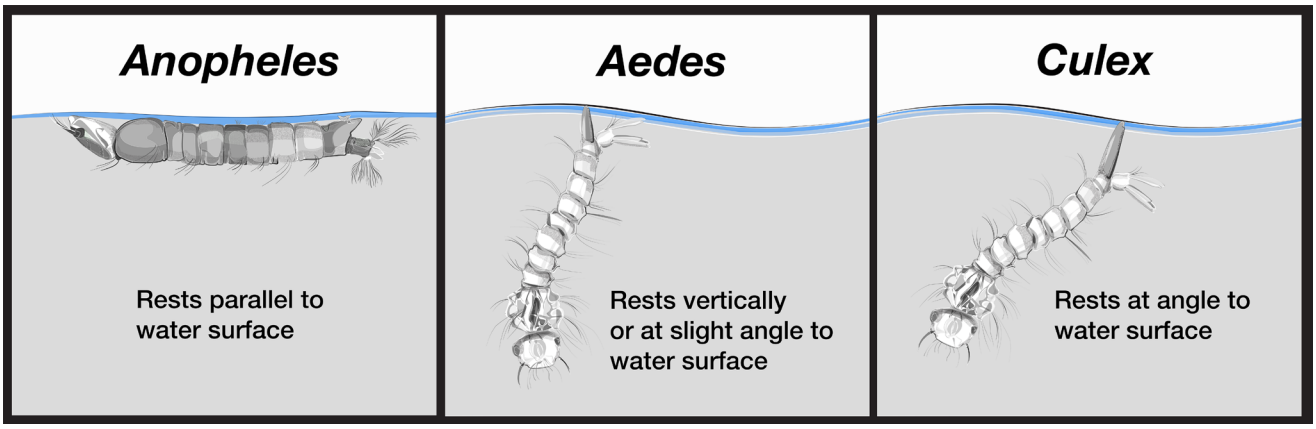
The coveted Mosquito Larvae Hunter's Badge will be awarded to you at the completion of your training.

As Training Director of the MLH program, I am counting on you. Good luck.

Your training begins now.

Your Three Prime Mosquito Larvae Targets

Our MLH artist sketched three types of mosquito larvae to use as examples:



Essential Mosquito Larvae Hunting Skills

To track down mosquito larvae and identify them will require knowledge and experience in five essential MLH skill areas. They include:

- **Visual analysis:** examining mosquito larvae and identifying parts, leading to identifying genera
- **Surveillance techniques:** observing mosquito behavior
- **Investigative techniques:** uncovering facts about mosquitoes
- **Personal defensive tactics:** protecting yourself with long-sleeved shirts, long pants, close-toed shoes, bug spray, and water-resistant gloves and goggles (if desired)
- **Removal of habitats from use:** emptying containers of standing water (the larvae habitat) when possible.

Build Your Visual Analysis and Surveillance Expertise

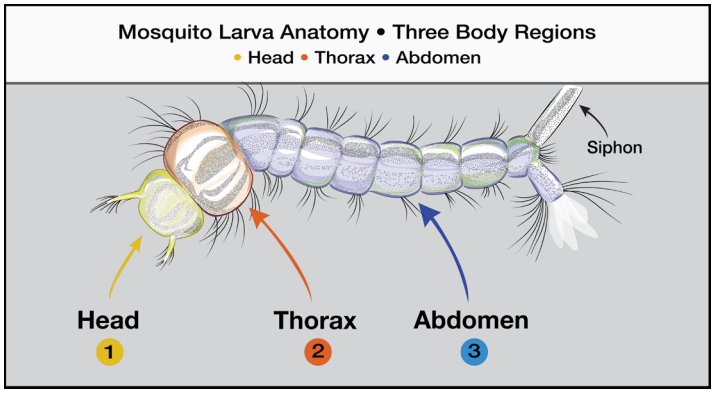
Let's begin with visual analysis and surveillance. The world - and its water supplies - are full of insect larvae. Before you start, you must be able to distinguish a mosquito larva from the many imposters that you will encounter during your fieldwork investigations. You will do this by examining larvae appearance (visual analysis) and larvae behaviors (surveillance).

Seven clues: Based on intelligence reports from leading entomologists (people who study insects), we have compiled seven clues that are fundamental to larvae spotting.

Your task: Come up with a scientific explanation for each of the seven clues *(listed on Page 3)* based on evidence provided in the clue. Use your explanation to answer the questions.

Seven Clues to Help Spot Mosquito Larvae

Mosquito larvae have three distinct body regions: the head, thorax, and abdomen. Consult the **Mosquito Larva Anatomy** diagram to the right as you use the seven clues below to help you answer the questions.



Clue 1

Mosquitoes lay their eggs - and spend the first three stages of their life - in water.

- **Where would you look for water sources that could contain larvae if you were outside ...**

... your home? **.... at a park?** **... at a school?**

- **Where would you look inside your home?**

Clue 2

Mosquito larvae are found in still or standing water, not flowing water.

- **Why do adult mosquitoes lay their eggs in still or standing water?**

Clue 3

Mosquito larvae must breathe air. Almost all larvae breathe through the tube found on their tail-end. *Note: Anopheles larvae do not have this tube.*

- **What is the name of this tube?**
- **Where in the water will the mosquito larvae be "hanging out"?**

Clue 4

Mosquito larvae have NO legs (only adult mosquitoes have legs).

- **Why would legs be absent in a larva, but present in an adult?**

Clue 5

You will often find mosquito larvae resting at the water's surface. Some larvae, like *Culex* and *Aedes*, suspend their body from their siphon. On the other hand, *Anopheles* larvae lie with their body parallel to the surface.

- **Regardless of how they lie, why do larvae need frequent contact with the water's surface?**

Clue 6

The head of the mosquito larva is rounded (not elongated, square, or triangular). The head is distinct from the thorax.

- **Can you name three sensory organs found on a mosquito larva's head?**

Clue 7

The thorax of a mosquito larva is generally wider than its head or abdomen.

- **What features of an adult mosquito (that allow it to move) are developing within the thorax region of larvae?**

Apply the Seven Clues to the "Bug-shot" Line-up

Any sample of still or standing water can potentially contain many different types of insect larvae. As a MLH, you must be able to differentiate a mosquito larva from an imposter. Here is your chance to practice.

- **Examine the images** of the five aquatic larvae displayed in the "Specimen" column of the chart below.
- **Each column to the right of the "Specimen" photo** lists one of the seven clues described on Page 3. Put a checkmark in the box if you determine that the specimen displays that clue's characteristic (if it does not, or if you are uncertain, leave the box blank).
- **Remember that a mosquito larva does not have to show all seven "clue" characteristics.** For example, some mosquitoes (*Anopheles*) do not have a siphon (Clue Three). In addition, parts may not be clearly shown in the photo. For example, it may not be clear whether the head is rounded (Clue Six), but all the other "clue" characteristics indicating a mosquito larva seem apparent.
- **Make your decision** on whether it is a mosquito or an imposter based on your best observations and reasoning.
- **For this training exercise,** all five larvae are shown larger than actual size and are laid facing the same direction. All were found in standing water; no information was provided on where in the water (at or below the surface) each was found.

SPECIMEN	CLUE 1 In the water	CLUE 2 In still water	CLUE 3 Has a siphon	CLUE 4 No legs	CLUE 5 Rests at surface	CLUE 6 Rounded head	CLUE 7 Wide thorax	MOSQUITO *or* IMPOSTER?
								
								
								
								
								

Urgent Communiqué

From the office of the MLH Director

Congratulations! You have successfully completed Level 1 Training and have been approved to begin Level 2 Training on field investigations. Before beginning, you will need to assemble an MLH toolkit. **Read the sheet below for details.**

Assemble your MLH Field Toolkit Now

- **A smartphone or smartdevice** to follow instructions for your tasks using the **GLOBE Observer app**. *https://observer.globe.gov*

- **Plastic bags and a baster** to scoop up and store a water sample holding larvae for transporting and observation.

- **White paper plates** so that you can better see features when you magnify or photograph your larva specimen, **toothpicks** to turn or move the larva around on the plate, and **hand sanitizer** to euthanize larva for easier inspection.

- **Magnifier (hand or phone clip-on)** to see important identifying features of the larva's body.

- **Paper towels** to soak up excess water surrounding larvae on the paper plate, making observations easier.

- **Personal items** to ensure safety in the field, such as **bug spray**, **fieldwork attire** (long pants, long-sleeved shirt, close-toed shoes) and **goggles/gloves** (if desired).

Field Investigation training will arrive soon. Watch for it.

CHECK YOUR PROGRESS: Answers to the Seven Clues

To check your progress, here are sample answers for each of the seven clues listed on Page 3, and the identification of larvae vs. imposters:

- **Where would you look for water sources that could contain larvae if you were outside ...**

  ... your home? Bucket, flowerpot, birdbath, grill, pet dish, wading pool, toys, rain gutter, trash areas, air conditioners.

  ... at a park? Trash cans, discarded food/drink containers, fountains, tree holes, plant clumps.

  ... at a school? Playground equipment, bases holding signs, benches, plant containers.

- **Where would you look inside your home?**

  Flower vase, flower pot, pet dish, leaking pipes, under sink.

- **Why do adult mosquitoes lay their eggs in still or standing water, instead of flowing water?**

  Eggs and larvae are fragile. Flowing water could result in injury or death to either of them.

- **What is the name of this tube?**

  This tube is called the siphon.
  The larvae will be “hanging out” at the surface of the water.

- **Why would legs be absent in a larva, but present in an adult?**

  The larvae are confined to the water where they float. Adults fly in the air but must have legs to land on surfaces and move about.

- **Regardless of how they lie, why do the larvae need frequent contact with the water’s surface?**

  Mosquito larvae breathe air; therefore they must have contact with the surface to breathe.

- **Can you name three sensory organs found on a mosquito larva’s head?**

  The three sensory organs are the eyes, the antennae, and the mouth.

- **What features of an adult mosquito (that allow it to move) are developing within the thorax region of larvae?**

  The legs and wings of the adult develop within the thorax, emerge from the thorax, and are attached to the thorax. Legs and wings also require muscles to operate; the thorax houses those muscles.

CHECK YOUR PROGRESS: Answers to the "Bug-Shot" Line-up

SPECIMEN	CLUE 1 In the water	CLUE 2 In still water	CLUE 3 Has a siphon	CLUE 4 No legs	CLUE 5 Rests at surface	CLUE 6 Rounded head	CLUE 7 Wide thorax	MOSQUITO *or* IMPOSTER?
	√	√		√				Imposter
	√	√		√		√	√	Mosquito
	√	√						Imposter
	√	√		√				Imposter
	√	√	√	√	√*	√	√	Mosquito

* **How can you tell that this larva** is one that rests at the surface, without seeing it in water? Super sleuths will have spottted the presence of a siphon (the breathing tube) on the left side of the image - it is the darker cylinder-shaped tube *(see the sketches on **Page 2** of the three types of mosquitoes).*