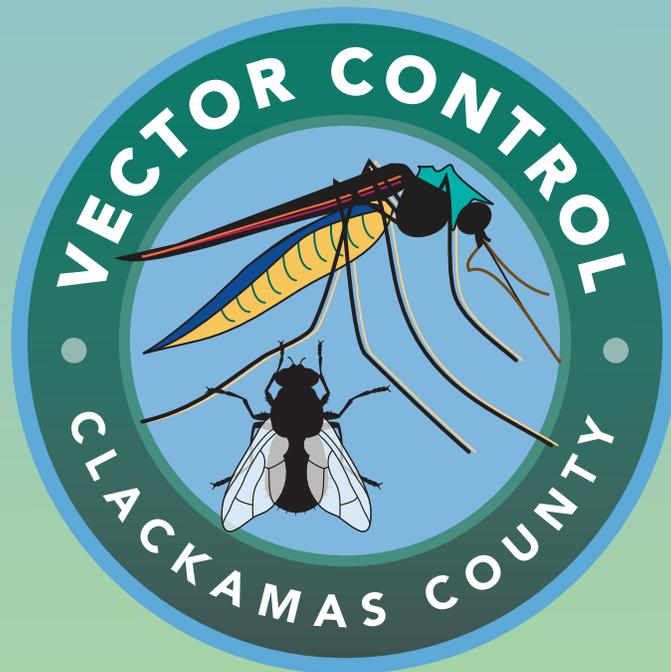


# FIGHT THE BITES!

## Investigating Mosquitoes + Other Disease Vectors

*Engaging Hands-On Science Lessons  
with Free Supporting Resources  
Adaptable for Grades K-12*



# Teacher's Guide



## Appreciation + Thanks

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# Introduction

## *Fight the Bites! Investigating Mosquitoes + Other Disease*

**Vectors** is designed to engage students in enjoyable hands-on science inquiry about disease vectors and how to stay safe from them. Each lesson in the curriculum is aligned to the Next Generation Science Standards (NGSS) and Common Core State Standards, and care was taken to integrate art and other content areas, as well, in a wholistic approach. They can be adapted to meet the needs of



learners in grades K–12 through the support of hands-on Life Cycle Kits including live mosquito larvae available free from Clackamas County Vector Control District (CCVCD). Numerous adaptations/ extensions are also included in each lesson which can help you tailor the lessons for your students.

## **Clackamas County Vector Control District's Education Program**

CCVCD supports a comprehensive vector education program for grades K-12. It is a collaborative effort between District staff, outside professionals, state and local agencies, and school educators. Serious vector-borne diseases such as West Nile virus have been spreading into Oregon, and our students and families need to understand why this is happening and how to protect themselves.

Education is an integral part of the Integrated Vector Management Program utilized by CCVCD. We believe that local mosquito control starts with the citizens of Clackamas County in their yards and neighborhoods. Armed with knowledge of mosquito and other vector biology, informed citizens know what actions they can take to suppress the populations of disease vectors.

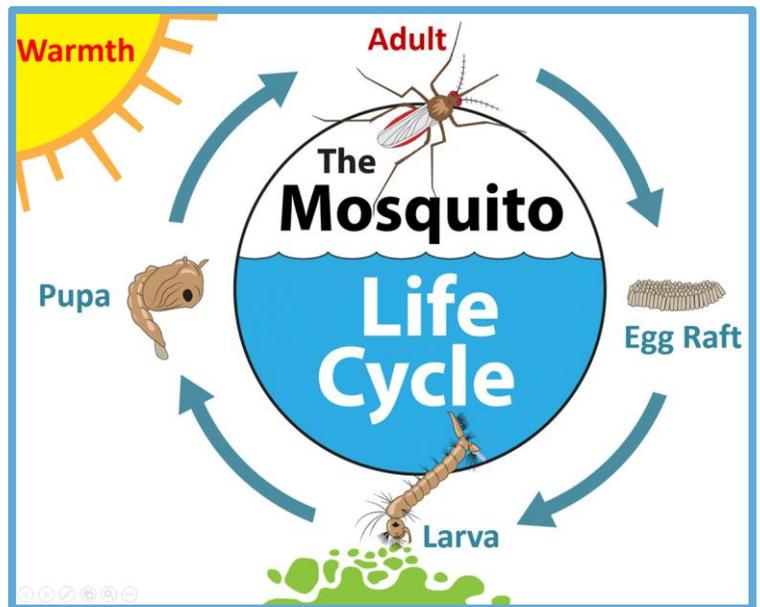
## **Free Classroom Resources**

CCVCD staff are pleased to be able to support educators and students with hands-on resources including mosquito larvae in safe emergence cages, macro lens magnifiers, pipettes, and more, as well as visits by biologists and other experts. Interactive multimedia presentations can be shared with students, in addition to the activities, or educators can download the presentations and other resources from our website at [fightthebites.com/education](http://fightthebites.com/education). We seek to inspire students to think critically about mosquitoes and other potential disease vectors, including their fascinating life cycles and adaptations, and we appreciate you joining us in this important collaborative effort!

Each class keeps a Life Cycle Kit for about two weeks. It contains learning tools that allow students to actively study the biology, ecology, and control of mosquitoes. Students are able to safely observe the metamorphosis of mosquito larvae into pupae and then flying adults. Mosquito fish (*Gambusia affinis*) may also be included so students can study the effects of a biological control.

Educators are provided with supplemental resources, including this teacher's guide with suggested lesson procedures, experiments, simulations, and other guided activities that

reinforce key concepts. Students are also provided with information to take home, including CCVCD contact information and our services that are provided free of charge.



### Objectives of CCVCD's Education Program include:

- Students demonstrate understanding of the mosquito life cycles and that mosquitoes require water to develop.
- Students can explain that some mosquitoes can transmit certain diseases to people and other animals.
- Students can explain verbally and in writing how they can help in the fight against mosquitoes by dumping standing water and educating others about mosquitoes.
- Students demonstrate skills such as careful observation, scientific illustration, data recording, data analysis, graphing, and written/oral expression.

Our education program also aims to increase student STEM and language skills, including:

- Making and recording observations
- Classifying information
- Measuring and counting
- Stating and testing hypotheses
- Describing observations
- Explaining reasoning verbally and in writing
- Identifying and expressing responses to science-related questions
- Using technology as a productivity tool and to enhance learning
- Working in teams to solve problems and
- Critical listening and reading.

Students are encouraged to ask questions, brainstorm solutions, gather information, analyze and interpret data, and communicate their discoveries. They often work in pairs or small groups. These are learning styles that enhance understanding, cognitive skills, and social skills (Moreno 1999).

Developing these skills in our students is essential for an adult citizenry literate in science and for attracting students to professional work in the sciences.

## Lesson Plan Format

Each lesson has the following sections:

- Overview
- Lesson Goals
- Objectives
- Alignment to Standards
- Materials + Preparation
- Suggested Procedure
- Adaptations / Extensions
- More Resources / References

The lessons also include a text box that lists subjects covered, the suggested grades to which the lessons can be adapted, the average duration of the lesson, and vocabulary words which are explained in the lesson and in the glossary at the end of the guide.

Materials meant for teachers all begin with bold-face headers in **white**. Handouts and other materials meant for students all begin with a large, bold-face header in **blue text**. An exception is the glossary, which is a resource for both teachers and students.

**Subjects:** Science, Math, Reading, Writing, Speaking & Listening, Art, Health, Social Studies

**Grades:** Adaptable for K–12

**Duration:** 30–50 minutes

### Vocabulary

- Hypothesis
- Larva / larvae
- Life cycle
- Metamorphosis
- Pupa / pupae
- Scientific method
- Vectors
- Vector-borne disease

## Alignment to Standards

*Fight the Bites!* need not compete with core curriculum for classroom time. Instead, it can help teachers cover core concepts and improve student skills by using hands-on materials and field study in local areas. To help teachers identify the ways in which the lessons can be used to meet their curriculum requirements, each lesson is correlated to standards. A chart like the one below is included in each lesson plan which lists the standards met.

Standards		Middle School (Grades 6-8)
Next Generation Science Standards (NGSS)	Crosscutting Concepts	<ul style="list-style-type: none"> <li>• Structure and Function</li> <li>• Stability and Change</li> </ul>
	Science & Engineering Practices	Obtaining, Evaluating, and Communicating Information
	Disciplinary Core Ideas	LS1.A: Structure and Function LS1.B: Growth and Development of Organisms
Common Core State Standards	Speaking & Listening	1, 2, 4, 6
	Language Standards	1, 2, 3, 6
	Writing Standards Science & Technical Subjects	4, 7, 10
	Math Geometry (Grade 5)	1, 2

Please Note:

- Numbers and letters listed for the standards correspond to those in the respective sections of the standards. Links to the standards are provided in the References section at the end of this introduction.
- Lessons are designed to meet multiple standards, but due to space considerations, those listed may not be completely comprehensive. Educators are encouraged to reinterpret standards and lessons and adapt lessons to meet their educational objectives and particular standards.

## Free Posters, Training, and More!

The “Beware of Mosquitula!” poster describes fascinating mosquito adaptations and how to stay safe from the real-life blood suckers. Contact CCVCD if you would like one or more copies of the poster.

Please also let us know if you would like details about free hands-on and/or online training opportunities or if there is anything else we can do to support you.

You can contact us at 503.655.8394 or via the contact form at [fightthebites.com/contact-us](http://fightthebites.com/contact-us).

Thank you for partnering with us to help keep our students and communities safe while we enhance science literacy and other important skills for life.

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Moreno, N. P. 1999. K-12 science education reform—a primer for scientists. *BioScience*. 49(7): 569-576.

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