

VANDERBILT UNIVERSITY Microbiome Initiative

Due to the COVID-19 pandemic, we realize students may not have access to hands-on instruction and lab equipment this fall. STEM participation and education are more important than ever! We are offering FREE sample preparation so all students may participate in scientific research.



vu.edu/wolbachia

\*Supplies and free wolbachiaproject@vanderbilt.edu shipping available.





Microbiome Initiative







EXPECTATIONS

Eligibility: High school students and teachers in the US

#### List of Requirements:

- Computer
- Internet access
- Mobile device with camera
- Rubbing alcohol (70% isopropanol)

- 1.5 mL tubes\* or a small sample jar
- Parafilm or tape
- Plastic sandwich bag

#### **Student expectations:**

- Take a picture of and collect an arthropod (ideally smaller than a grain of rice).
- Dissect abdomen of arthropod if larger than a grain of rice, store it or whole tiny insect in 70% isopropanol
- Perform bioinformatics analyses
- Submit results to The Wolbachia Project Database

#### **Teacher expectations:**

- Notify Vanderbilt of your intent to participate there is limited sampling capacity
- Support students, guide through The Wolbachia Project
- Compile samples and send in one package to Vanderbilt University\*
- Ensure that students complete data entry

#### What you can expect from us

- Step-by-step detailed curriculum
- Free DNA extraction and sequencing
- Results in 2-3 weeks: you will receive a picture of the agarose gel and DNA sequencing (if successful)
- Opportunity for your class to Zoom with a Vanderbilt scientist
- Not all samples are guaranteed to work; some DNA may not be detectable by our general primers
- We are not responsible for lost shipments

\*We can provide materials and shipping, if needed





### **INTENT TO PARTICIPATE**

#### Please complete the following information and email to: wolbachiaproject@vanderbilt.edu

#### What do we need?

- Teacher name
- School / City / State
- Class(es) i.e., Biology, CTE, Microbiology, etc
- Total number students
- Anticipated shipment date
- Do you agree to upload student results to The *Wolbachia* Project Database?





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### HANDS-ON LAB ACTIVITY

Assign to students: The Wolbachia Project's Lab 1.

### Submit the samples:

Once abdomen of arthropod is dissected and in ~1mL of 70% isopropanol (rubbing alcohol), follow submission protocol below:

- 1. Label each tube with student initials and sample number.
- 2. Wrap each tube in parafilm or tape to prevent leakage during transit.
- 3. Place EACH TUBE in a separate Ziploc bag with an index card/sheet of paper including:
  - Student initials and sample number
  - Teacher name/school
  - Arthropod identity
- 4. Compile all bags into one padded envelope or small box and mail to:

### FedEx/UPS:

Bordenstein Lab Vanderbilt University 465 21<sup>st</sup> Ave South, MRBIII u7217 Nashville, TN 37232

#### USPS

Bordenstein Lab Vanderbilt University VU Station B, Box 35-1634 Nashville, TN 37235

5. Send an email to **wolbachiaproject@vanderbilt.edu** to let us know your samples are on the way!

Scientists at Vanderbilt University will process your student's samples. In the meantime, your students can practice virtual online molecular biology techniques!





### VIRTUAL ACTIVITIES (PART 1)

Vanderbilt scientists will perform: DNA extraction, PCR, gel electrophoresis, and Sanger sequencing on student samples. We have provided explanations and simulations of these molecular biology techniques.

Click to open links in a new window.

#### **Background techniques:**

<u>Labxchange: simulation, micropipetting</u>

**DNA extraction** (extract DNA from arthropod for further analysis):

- LabXchange: interactive, what is DNA?
- Yourgenome: activity, cracking DNA's code
- <u>Yourgenome: video, activity, extracting DNA from fruit</u>

**Polymerase Chain Reaction** (amplify DNA extracted from arthropod to look for presence of *Wolbachia* and arthropod DNA):

- <u>CK12: interactive, what is PCR?</u>
- <u>MiniPCR: video, what is PCR?</u>
- DNA Learning Center: animation, cycles of PCR





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### VIRTUAL ACTIVITIES (PART 2)

**Gel electrophoresis** (visualize amplified DNA):

- <u>Amoeba sisters: video, gel electrophoresis</u>
- LabXchange: simulation, gel electrophoresis

#### Sanger sequencing (DNA barcoding):

- <u>ThermoFisher: video, What is Sanger sequencing?</u>
- <u>Yourgenome: Interactive game, can you sequence faster than a</u> <u>machine?</u>

### **Extension learning**

• <u>Kurzgesagt: video, The Deadliest Being on Earth – The</u> <u>Bacteriophage</u>





### DURING SAMPLE PROCESSING

During and after sample processing by Vanderbilt University, your students should continue their exploration of data and biotechnology.

Students create an entry in The Wolbachia Project Database. They upload their arthropod picture and observational data. (Students share their findings and data with others in The Wolbachia Project).

share their findings and data with others in The Wolbachia Project):

<u>Wolbachiaprojectdb.org</u>

**Explore The Wolbachia Project database** (Have other people found arthropods near you?):

Wolbachiaprojectdb.org

**Complete the Vector Control WebQuest with a group** (Explore how to communicate science to different audiences):

• To be released on <u>vu.edu/wolbachia</u>

**Complete essay questions** (Students share their opinion on topics that explore bioethics):

To be released on <u>vu.edu/wolbachia</u>