Buzz Buzz Bite!
Disease Transmission Simulation Game
Teacher Notes

**PART I (Direct Transmission):** a classic direct disease transmission lab often used to demonstrate HIV or influenza transmission from person-to-person contact.

**Part II (Indirect Transmission):** an adaptation of this lab to simulate indirect transmission of vector-borne diseases. This section demonstrates transmission of the chikungunya virus (ChikV) by *Aedes* sp. mosquitoes, causing the disease chikungunya in humans.

**Reagents** (measurements do not need to be exact)

- **Infected Solution**
  - Sodium carbonate (washing soda): 1 g (approx. 1/4 teaspoon)
  - 100 mL water

- **Indicator Solution**
  - Phenolphthalein: 0.1 g (approx. 1/4 of 1/8 teaspoon)
  - 100 mL ethyl or 70% isopropyl (rubbing) alcohol

Phenolphthalein indicator will turn dark pink or red in the presence of a base (washing soda).

**Non-toxic Reagents** (measurements do not need to be exact)

- **Infected Solution**
  - 2 tbsp. baking soda
  - 500 mL of water

- **Indicator Solution**
  - 1/4 tsp. turmeric
  - 4 tbsp. isopropyl (rubbing) alcohol

Turmeric indicator solution will turn orange or red in the presence of a base (baking soda).

**Game Play**
Depending on grade level and the number of students in your class, students can play both parts of the game in approximately one 50-minute class period.

This timeframe does not include discussion of direct and indirect transmission and the chikungunya virus, which is necessary to understand the lesson. You may find this information in the introduction to the Student Lab and in the exhibit panel on chikungunya.

If you have many students, it might be more time efficient to split the class. Half of the students play **Part I** while the others observe and record data; then they switch roles for **Part II**. Everyone gets to play one version of the game, but there is less movement in the classroom and less data to analyze. Some teachers assign the data analysis for homework to save class time.
Procedures

Part I – Direct Transmission (Human to Human)
1. This activity requires an even number of students.
2. Number the cups sequentially: 1, 2, 3, etc.
3. Each student takes a cup of fluid and a pipet.
4. Approximately 10% of the class should receive “infected” solution and the rest of the cups should contain water. Fill all cups with the same volume of fluid and record the cup numbers of those “infected.” Be careful to avoid cross-contamination.
5. The following suggestions may help you keep track of exchanges:
   - Project a blank chart from the handout onto your smart board or screen using a document camera.
   - Post a chart or paper on the board for the students or teacher to fill in data after each exchange.
   - Attach a sticky note to each cup to record exchanges.
6. Use logic to determine the transmission pathway and identity of the initial infected patient.

Part II – Indirect Transmission (Human to Vector to Human)
1. This activity requires an even number of students: half Mosquitoes and half Humans.
2. Assign roles to students or allow them to select for themselves.
3. Number the cups sequentially: M1, M2, M3, etc. for Mosquitoes; H1, H2, etc. for Humans.
4. Each student takes a cup of fluid, but only Mosquitoes take a pipet because Humans do not bite Mosquitoes. All Mosquitoes are females that must feed on blood to develop their eggs. The pipet represents the mosquito proboscis (mouthpart) that bites and takes a blood meal.
5. Only Humans will be initially “infected” in this activity, to demonstrate how infected humans can transmit pathogens indirectly to uninfected humans through a mosquito vector. Approximately 10% of the Humans should receive “infected” solution and the rest of the cups should contain water. Fill all cups with the same volume of fluid and record the cup numbers of those “infected.” Be careful to avoid cross-contamination.
6. The following suggestions may help you keep track of the exchanges:
   - Project a blank chart from the handout onto your smart board or screen using a document camera.
   - Post a chart or paper on the board for the students or teacher to fill in data after each exchange.
   - Attach a sticky note to each cup to record exchanges.
7. Use logic to determine the transmission pathway and identity of the initial infected patient.