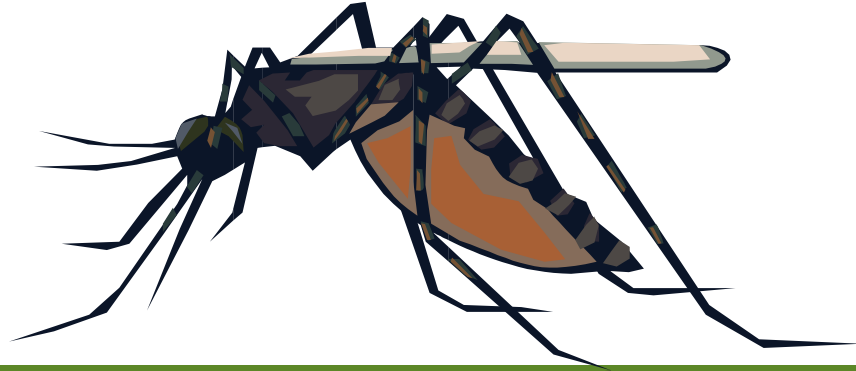


Humans vs. Mosquitoes



A Deadly Serious Game!



Climate and Emerging Infections
Vector-Borne Disease Investigations



A disease transmission simulation. Grades 6-12.

This game *Humans vs. Mosquitoes* (<http://www.humansvsmosquitoes.com>), by Clay Ewing, Lien Tran, Mohini Freya Dutta, Ben Norskov, Eulani Labay, Sophia Colantonio, Lauren Graham, Vanessa Lamers, and Kanchan Shrestha, is made available under the terms of the Creative Commons Attribution-ShareAlike 3.0 license (CC BY-SA 3.0, <http://creativecommons.org/licenses/by-sa/3.0/>).

Yale Peabody Museum of Natural History
Peabody Fellows Program

SEPA SCIENCE EDUCATION PARTNERSHIP AWARD
Supported by the National Institutes of Health R25OD011112

© 2013 Yale Peabody Museum of Natural History. All rights reserved.

Humans vs. Mosquitoes



INSTRUCTIONS

Mosquitoes want to bite humans and lay eggs.

Humans want to kill mosquitoes and protect themselves from dengue.

Who will survive?

Play the game like **Rock, Paper, Scissors** mixed with **Freeze Tag**
– but the results are deadly serious!

Mosquitoes WIN if they KILL all the **Humans** first
by depleting their Blood Tokens!

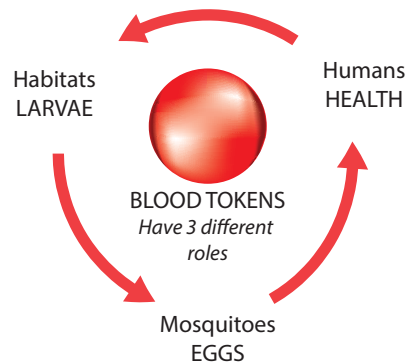
Humans WIN if they KILL all the **Mosquitoes** first
by clearing out the Habitats!

Draw a **Climate Card** to change the course of the game!

LEARN how climate change and human behaviors
can influence the spread of dengue.

Game Equipment

- **23 Blood Tokens** that represent EGGS for Mosquitoes, LARVAE for Habitats, and HEALTH for Humans
- **6 Habitats:** Places where mosquitoes can lay eggs
- **8 Climate Cards**
- **6 Nametags**
- **Dice**



How to Play

Participants: 6 Players and 1 Facilitator.

3 Mosquitoes face off against **3 Humans** across a table.
The **Facilitator** runs the game and reads Climate Cards,
which can change the course of the game.

Team MOSQUITO: 11 Blood Tokens (EGGS/LARVAE)

Distribute 9 tokens among all 3 Habitats any way you want. Divide the last 2 tokens among Mosquitoes so Humans do not know who has extra eggs.

Mosquito Goals and Actions:

1. **Bite humans** and feed on blood to develop eggs that hatch into LARVAE:
POINT AT A HUMAN.
2. **Lay eggs** to repopulate Habitats with LARVAE:
POINT AT A HABITAT.

- All Mosquitoes are females that feed on human blood.
- A Mosquito DIES when a Habitat is cleared.
- Habitats are LOST when Humans kill all LARVAE (clear all Blood Tokens).

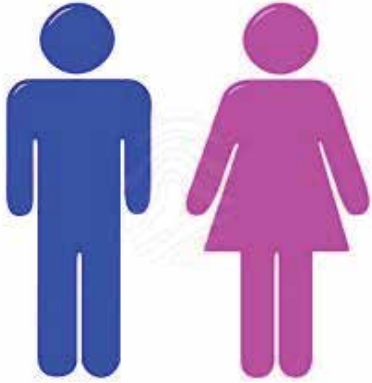
Team HUMAN: 12 Blood Tokens (HEALTH)

Divide up all tokens so Mosquitoes do not know which Humans have the most tokens and are healthiest.

Human Goals and Actions:

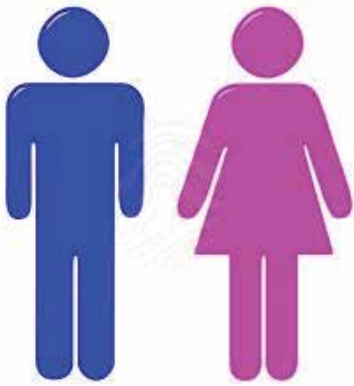
1. **Protect yourself** from Mosquito bites:
CROSS ARMS OVER CHEST.
2. **Kill LARVAE** by clearing out Habitats:
POINT AT A HABITAT.

- Humans DIE when they lose all Blood Tokens (HEALTH).
- Humans **cannot** directly kill adult Mosquitoes.



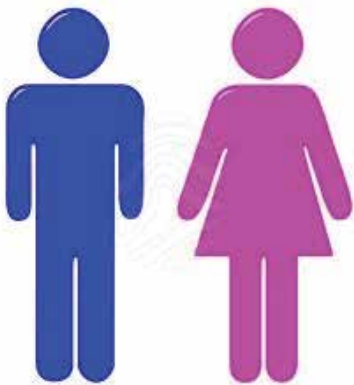
HUMAN Goals & Actions:

- 1) **Protect yourself** from Mosquito bites:
CROSS ARMS OVER CHEST.
- (2) **Kill LARVAE** by clearing out Habitats:
POINT AT A HABITAT.



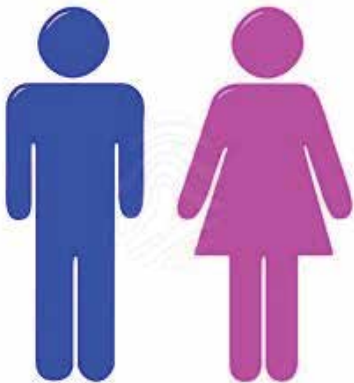
HUMAN Goals & Actions:

- 1) **Protect yourself** from Mosquito bites:
CROSS ARMS OVER CHEST.
- (2) **Kill LARVAE** by clearing out Habitats:
POINT AT A HABITAT.



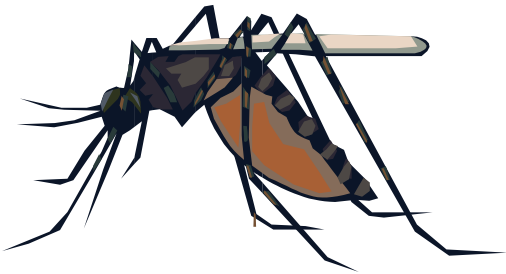
HUMAN Goals & Actions:

- 1) **Protect yourself** from Mosquito bites:
CROSS ARMS OVER CHEST.
- (2) **Kill LARVAE** by clearing out Habitats:
POINT AT A HABITAT.



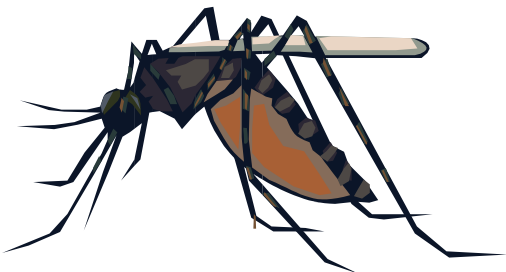
HUMAN Goals & Actions:

- 1) **Protect yourself** from Mosquito bites:
CROSS ARMS OVER CHEST.
- (2) **Kill LARVAE** by clearing out Habitats:
POINT AT A HABITAT.



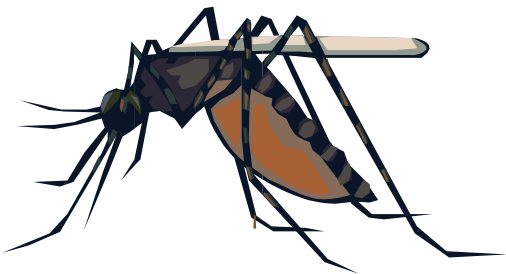
MOSQUITO Goals & Actions:

- (1) **Bite humans** and feed on blood to develop eggs that hatch into LARVAE:
POINT AT A HUMAN.
- (2) **Lay eggs** to repopulate Habitats with LARVAE:
POINT AT A HABITAT.



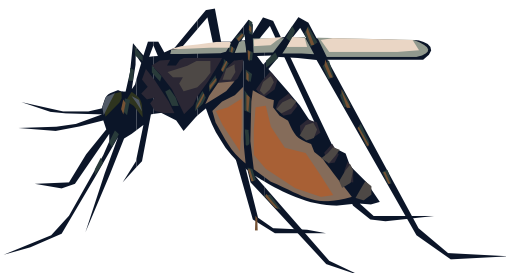
MOSQUITO Goals & Actions:

- (1) **Bite humans** and feed on blood to develop eggs that hatch into LARVAE:
POINT AT A HUMAN.
- (2) **Lay eggs** to repopulate Habitats with LARVAE:
POINT AT A HABITAT.



MOSQUITO Goals & Actions:

- (1) **Bite humans** and feed on blood to develop eggs that hatch into LARVAE:
POINT AT A HUMAN.
- (2) **Lay eggs** to repopulate Habitats with LARVAE:
POINT AT A HABITAT.



MOSQUITO Goals & Actions:

- (1) **Bite humans** and feed on blood to develop eggs that hatch into LARVAE:
POINT AT A HUMAN.
- (2) **Lay eggs** to repopulate Habitats with LARVAE:
POINT AT A HABITAT.

Climate Card Rain

Scenario: More rain falls in an area than in previous years.

Result: Increased rain fills open containers and creates new places where mosquitoes can lay eggs.

Consequence: Mosquitoes gain a new Habitat with one Egg and one new Mosquito (or a dead Mosquito can “come back to life”).

Climate Card Warmer Temperatures

Scenario: Some areas will experience warmer than usual temperatures.

Result: Warmer temperatures could decrease relative humidity and cause adult mosquitoes to die.

Consequence: One adult Mosquito dies.

Climate Card Humanitarian Aid: Habitat Clearing Campaign

Scenario: Red Cross Red Crescent visits your community and organizes a campaign to clear out mosquito habitats.

Result: People empty or cover water containers.

Consequence: Remove one mosquito Habitat. One adult Mosquito must die.

Climate Card Mosquito Adaptation

Scenario: Mosquitoes that previously laid eggs only in clean water now lay eggs in dirty water.

Result: Mosquitoes have adapted to their changing environment and can now live in new Habitats.

Consequence: Mosquitoes gain a new Habitat with one Egg and one new Mosquito (or a dead Mosquito can “come back to life”).

Climate Card Warmer Temperatures

Scenario: Some areas will experience warmer than usual temperatures.

Result: Warmer temperatures could cause the mosquito life cycle to speed up, creating a mosquito “baby boom”.

Consequence: Each Habitat gets one extra Egg.

Climate Card Drought: Water Shortage

Scenario: People save water in open containers during a drought.

Result: Mosquitoes can lay eggs in open storage containers.

Consequence: Mosquitoes gain a new Habitat with one egg and one new Mosquito (or a dead Mosquito can “come back to life”).

Climate Card Humanitarian Aid: Education Campaign

Scenario: Red Cross Red Crescent visits your school and teaches how to prevent dengue by clearing habitats instead of using insecticides.

Result: People are healthier because they empty standing water instead of using insecticides.

Consequence: All Humans gain one Blood Token. A dead Human can “come back to life”.

Climate Card Land Use Conversion

Scenario: Land is cleared for agricultural use.

Result: Changes in runoff, drainage patterns and irrigation create new places for mosquitoes to lay eggs.

Consequence: Mosquitoes gain a new Habitat with one Egg and one new Mosquito (or a dead Mosquito can “come back to life”).

Vector-Borne Disease Transmission Life Cycle

