Name: _____ Period: _____ Date: _____

Lesson 11: How does changing the environment that the bacteria are in affect their population?
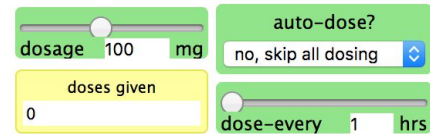
Procedure

1. Go to http://contagion.inquiry-hub.net/ to launch the simulation.

2. Start with this population distribution:

   init#–3pores 4   init#–4pores 8   init#–5pores 12   init#–6pores 16

3. Set the **DOSAGE**, **AUTO-DOSE?,** and **DOSE-EVERY** values to the ones shown here ---->

   auto-dose?
   dosage 100 mg   no, skip all dosing
   doses given
   0   dose-every 1 hrs

4. Set the **REPRODUCE-EVERY** and **REPRODUCE?** Values to the ones shown here -->

   reproduce–every 1 hrs
   ☑   reproduce?
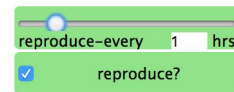
5. Set the **MAX#BACTERIA-TO-TRANSFER** to 40:
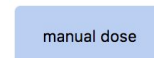
   max#bacteria–to–transfer   40
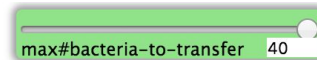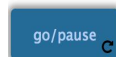
6. Press the **SETUP/RESET** to initialize the model.

   setup/reset
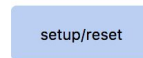
7. Press the **MANUAL DOSE** button once before running the model:
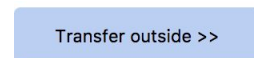
   manual dose

8. Press *GO/PAUSE* to run the model

   go/pause c

9. Once the population has grown to over 100 bateria, press the **TRANSFER OUTSIDE >>** button.
   (Make sure that go/pause is still depressed when you do this).

   Transfer outside >>

10. Record the distribution of trait variations in the population that is outside the patient. Read these monitors to find those values to record.

    # 3pores outside   # 4pores outside   # 5pores outside   # 6pores outside

11. One you recorded these values, Press the **<< INFECT NEW PATIENT FROM OUTSIDE** button.

    << Infect new patient from outside
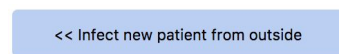
12. Press the **MANUAL DOSE** button again.

    manual dose
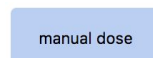
13. Repeat the last four steps, until you are on the fourth patient.

Observations

| Variation		Bacteria in the infection							
		Patient 1		Patient 2		Patient 3		Patient 4	
# of pores in the cell membrane	Color visualization for this variation	# of bacteria	% population made up of this variation	# of bacteria	% population made up of this variation	# of bacteria	% population made up of this variation	# of bacteria	% population made up of this variation
3	purple	4	10%						
4	green	8	20%						
5	brown	12	30%						
6	red	16	40%						
Total bacteria		40	100%	40	100%	40	100%	40	100%

~

Making Sense   Sketch graphs of your results.

Distribution of trait variations in each infection
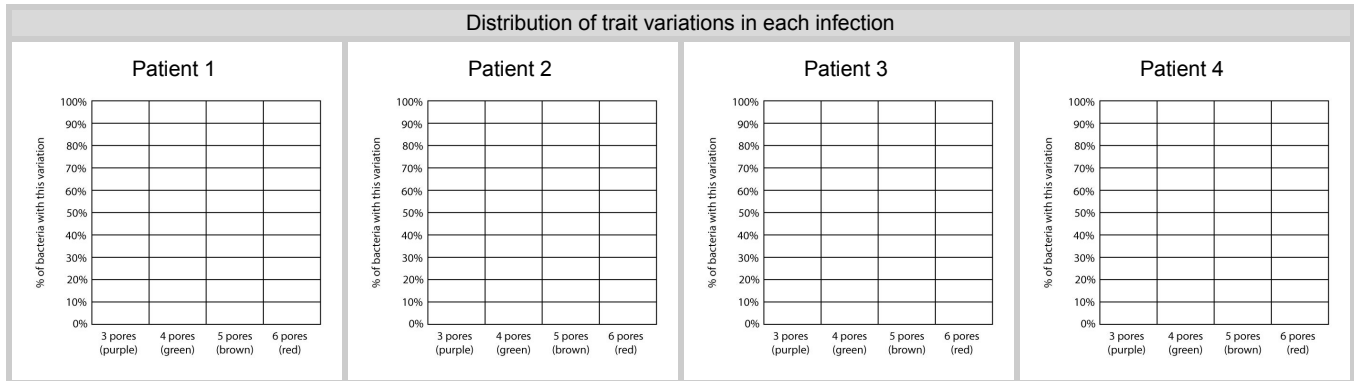
Q1. Compare the graphs between other students. What do you notice happening to the distribution of traits in this population over time?

Conclusions

How do the results of the simulations in Lessons 10 and 11 help you explain how it is possible that applying antibiotics can lead to a population that becomes more resistant to antibiotics then they were initially, even when individual bacterium traits are not changing and the trait variations that an offspring inherits are identical to those of its parent?

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