**How Does Competition Affect Population Growth?**

**I. Introduction**

 In this investigation you will conduct an experiment and grow two species of the protozoan *Paramecium*, alone and together. You will then compare growth curves of the populations of each species.

**II. Procedure**

 1. Start the activity by going to the following website :

<http://glencoe.mheducation.com/sites/dl/free/0078802849/383928/BL_04.html> .

 2. Click “More Information” to read about *Paramecium* and about populstion growth and

 competition.

 3. Begin the experiment by filling the test tubes with samples from the stock culture in the

 flasks.

 4. Click the bulb at the top of the pipette to fill the pipette with culture.

 5. Then click and drag the pipette to a test tube.

 6. Fill the three test tubes with *Paramecium* *aurelia*, *Paramecium caudatum*, and/or a

 combination of both. Note : There is rice in the test tubes. The rice is food for bacteria,

 which in turn will be food for the *Paramecium*. The two species of *Paramecium* do not prey

 upon each other.

 7. Click the Microscope on the back shelf to go to the lab bench.

 8. Click the Clean Microscope Slides Box to set up clean microscope slides.

 9. Click the test tubes to prepare wet-mount slides of the samples.

 10. Click and drag a wet-mount to the stages of the microscope. Count or estimate the number

 of cells of each type of *Paramecium*. Click the Grid On button for help with counting.

 11. Click the Table button to record your data. Note : The wells in the microscope slide holds

 0.5 mL. You need to multiply by 2 the number of cells you counted or estimated in order to

 obtain the concentration per mL.

 12. Click the Clear Slides button. Click the Calendar to advance it by two days. Then get a new

 set of clean slides, place samples on them, and count or estimate the number of *Paramecium*

 you see. Record your data in the Table.

 13. Continue the steps above until the Table is complete. Then analyze your data.

**III. Data**

 1. Record your data in the Table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  ***P. aurelia*****grown alone** **(cells/mL)** |  ***P. caudatum*****grown alone** **(cells/mL)** |  ***P. aurelia*****grown in mixed culture** **(cells/mL)** |  ***P. caudatum*****grown in mixed culture** **(cells/mL)** |
| **Day 0** |  |  |  |  |
| **Day 2** |  |  |  |  |
| **Day 4** |  |  |  |  |
| **Day 6** |  |  |  |  |
| **Day 8** |  |  |  |  |
| **Day 10** |  |  |  |  |
| **Day 12** |  |  |  |  |
| **Day 14** |  |  |  |  |
| **Day 16** |  |  |  |  |

**IV. Analysis & Conclusions**

 **1. On what day did the *Paramecium* *caudatum* population reach the carrying capacity of**

 **the environment when it was grown alone?**

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 **How do you know?**

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 **2. On what day did the *Paramecium aurelia* population reach the carrying capacity of the**

 **environment?**

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 **How do you know?**

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 **3. Explain the differences in the population growth patterns of the two *Paramecium***

 **species.**

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 **What does this tell you about how *Paramecium aurelia* uses available resources?**

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 **4. Describe what happened when the *Paramecium* populations were mixed in the same test**

 **tube.**

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 **Do the results support the principle of competitive exclusion?**

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 **5. Explain how this experiment demonstrates that no two species can occupy the same**

 **niche.**

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