Competition Study on two species of Paramecium

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Abstract—For the investigation of validity of the Lotka-Volterra model for competition between species, a simple competition was setup between two species of paramecium which are phenotypically distinguishable. It was found that both these species could co-exist and further, it was observed that their phenotypes began to 'interchange'. An evolution study was planned to test if differentially speedening the process of evolution for one species could lead to its better relative survival.

Keywords—Paramecium, competition study, lotka-volterra, evolution, co-evolution

1 Introduction

Evolutionary biology often explains the observed and very rarely predicts, roughly speaking. This experiment was aimed at putting evolutionary ideas to work for predicting the outcome of an experiment. We have been taught that organisms have co-evolved and it therefore makes sense to imagine that the organisms that could evolve faster, would've out-survived their competitors. To test this, we chalked out a two stage plan. The first was to test the prevailing Lotka-Volterra model for competition between two species of Paramecium. Second stage was to increase the rate of evolution, selectively for one species and observe the densities, as they compete.

2 Materials

For setting up one culture of a 100 mL volume, we used:

1) Beaker/Conical flask 100 mL
2) Elix Water (roughly 100 mL)
3) Yeast Powder (0.04 g per 100 mL)
4) Wheat Beads (3-4 per 100 mL)
5) Paramecium Sample

For finding the Paramecia from the 'wild' we required

1) Gloves
2) Centrifuge Tubes (essentially seal-able containers)
3) Pro-pipetter
4) Permanent Marker

3 Method

3.1 Counting Paramecium

Since counting is the heart of this experiment, repeatability was a very important concern. We did the following to ensure reliability of the data.

1) Volume for counting was taken to be very small ($10\mu L$ initially, and then dropped to $5\mu L$ finally) to ensure the total number of Paramecium are readily countable.
2) Videos were recorded using a digital camcorder, by pointing it through the lens of the eye piece of the Ziess microscope available in the Biology teaching lab.

3.2 Creating the culture

1) Took $40mL$ of Elix water in the flask.
2) Added 4 wheat seeds to the beaker and boiled it for 2 minutes, using a micro-wave oven.
3) Further, to it, $0.04g$ of finely grinded yeast powder was added immediately and stirred
4) The contents of the beaker were cooled to room temperature.
5) To this, the Paramecium culture was added and mixed
6) The volume was made $100mL$ by adding Elix water and mixed gently.
7) The culture created was incubated at 25^oC.

3.3 Finding the Paramecia

1) At first we decided a location like a small pond, puddle, etc. and then after wearing

gloves, extracted some water using pipette and pro-pipetter and dumped the water in a fresh centrifuge tube and marked it using appropriate label.
2) We repeated the above procedure for different depths and also at various other locations in the water body.
3) Then we took a drop of water from each tube in a glass slide and observed it under a microscope and we reported about our observations.
4) Once, a particular species of paramecium was found, we reported it to "Dr. N.G. Prasad" and then we had setup the cultures.

4 Apparatus

The following were available and used from the Biology Teaching Laboratory.

1) Zeiss Stemi DV4
2) Pathological Microscope

5 Experimental Procedure

6 Observations

6.1 Densities

6.2 Qualitative Observation

7

7.0.1 Subsubsection Heading Here

8 Conclusion

Appendix A
Proof of the First Zonklar Equation

Appendix one text goes here.

Appendix B

Appendix two text goes here.

Acknowledgments

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