



CALIFORNIA STATE SCIENCE FAIR 2013 PROJECT SUMMARY

Name(s)

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Project Number

33851

Project Title

The Effects of Different Yeast Concentrations and Algae on the Chemotaxis of *Physarum polycephalum*

Abstract

Objectives/Goals

Explore chemotactic responses of *P. polycephalum* in culture exposed to various amounts of yeast, algae, and then algae and yeast in combination. Will the plasmodial slime mold detect cues, collect and integrate information about its surroundings, and move towards the yeast? Perhaps the algae? Or will they migrate away?

Methods/Materials

- Culture the Physarum.
- Make Solutions with Varying Concentrations of Yeast (.1, .1, 10, and 100 mM concentrations.
- Prepare Plates with 8x2cm filter strips.
- Soak the labeled strips of filter paper in the appropriate cups containing the varying yeast concentrations.
- Place 2 strips of growing physarum below a growing Physarum culture.
- Transfer four such blocks, plasmodium-side down, onto the junction of the two filter paper strips.
- Observe plasmodium movement every hour for several hours.
- Repeat same procedure, with yeast and algae; then algae alone.

Results

The Plasmodial slime molds migrated towards the higher concentration of yeast at 10mM and 100mM and their migration appeared less for lower concentrations of yeast like 1mM or .1mM solutions. This suggests that the chemical cues in the lower concentration solutions weren't as strong as those of higher concentration, which may have led to a decreased chemotactic response by the slime molds. When the experiment was repeated under the same conditions for an algal mixture comprising of 5 different species (*chlorella vulgaris*, *scenedesmus quadricauda*, *selenastrum capricornutum*, *ulothrix fimbriata*, and *volvox aureus*), the slime molds grew away from the algae 44% of the time, grew towards both the control and algae 42% of the time, and towards the algae alone only 13% of the time. When the experiment was done a third time using yeast and algae growth away from the algal mixture soared higher.

Conclusions/Discussion

This suggests that the slime molds are not particularly attracted to algae; in fact they may even be repulsed by them. If the slime molds were to be exposed to algae and live in an environment where that was there only nutritional source then they would most likely be transformed into a hard, dry, inactive mass called a sclerotium. It becomes a plasmodium again when favorable conditions return or in this case, when a new nutritional source such as yeast makes itself present.

Summary Statement

Explore chemotactic responses of *P. polycephalum* in culture exposed to various amounts of yeast, algae, and then algae and yeast in combination.

Help Received

Mother helped drive me to get desired equipment and father helped order plasmodial slime molds.