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# EXPERIMENTS DESIGNED BY STUDENTS: UV SENSITIVE YEAST EXPERIMENT

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*This edition of the MSTA journal has a new section that showcases student work. The purpose of this section is to encourage the use of student inquiry across the state. Student inquiry at it's best allows kids to mirror real science. When students use the scientific method to investigate their own questions they are not only more interested in their work, they are doing real science. This new section of the journal will be a place for students to share their research. These experiments can then be replicated and tested by others!*

*Students may submit experiments that resulted from various types of inquiry assignments. While some experiments might only have a slight variation from a protocol given by the teacher, other experiments might have procedures that are quite unique.*

## **A description of the assignment that led to the experiment:**

Carolina Biological has a strain of yeast that is sensitive to UV light. When this strain of yeast is exposed to UV light it will not grow as well as the wild type yeast. You can order a class kit that can be used as a coupled inquiry assignment. Students need help with the procedure in order to understand sterile technique and how to grow the yeast. This time when we ran the experiments, I had students spend a day researching in the library for background about growing yeast, UV light and sunscreen. Students also spent

time in class discussing the connections between all of these factors. Each group designed an experiment that used the UV yeast. It is important when designing that at least one petri-dish is left out of the UV light completely as a control that demonstrates the growth of UV sensitive yeast. If this experiment is conducted in strong enough light there is a chance that no UV sensitive yeast grows in even dishes with sunscreen or fabric coverage.

Students understood going into the lab that one experimental write up from the classes would be published in the MSTA Journal. This changed the quality of work for many students! Students liked the idea that their work could be read by teachers and students across the state of Michigan. In the end, several experiments were good enough to publish. Next time, I need to be sure to require references in the student work rather than including them myself. The experiment that follows, by Veronica Vachon, stood out as the most clear and easy to follow.

## **UV Sensitive Yeast Resources:**

1. The kit from Carolina Biological is called: **Sunscreen for Yeast—and People Too!** It can be found at: <https://www2.carolina.com>
2. Observing UV damage in UV-sensitive yeast: [http://www.labarchive.net/labdb/get.tcl?experiment\\_id=191](http://www.labarchive.net/labdb/get.tcl?experiment_id=191)
3. RAYDAY '98 <http://www.accessexcellence.org/LC/OP/RAY/>

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## UV SENSITIVE YEAST EXPERIMENT

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### **Problem:**

If not exposed to light or protected from it will Ultra Violet sensitive yeast grow?

### **Information:**

UV sensitive yeast lacks the DNA repair enzyme so if the DNA is damaged it cannot be mended. When the DNA is damaged the UV sensitive yeast cannot grow. Sun block is used to prevent damage in human skin cells by protecting the skin from UV rays. The sun block contains SPF, which enables it to do so. The higher the SPF the more protection it offers.

### **Hypothesis:**

UV sensitive yeast will grow when not exposed to UV light.

## Experiment:

In order to test our hypothesis our group created the following experiment. We would use the sun block as a variable, putting it on two petri dishes and leaving the other two blank, then put the UV sensitive yeast out in the sunlight (our control and experimental groups). The materials we used were: four petri dishes, a capped tube with 10ml of sterile water, a toothpick, a suction syringe, sun block with SPF 8 and one with SPF 50, glass beads, and aluminum foil. We then performed our experiment in the following steps:

1. Pick up a colony of UV sensitive yeast with the toothpick.
2. Pour 10ml of sterile water into the capped tube, then swirl the toothpick (yeast end) in the tube of sterile water.
3. With the suction syringe take 250 microliters of the solution and pour that amount into each petri dish.
4. Pour a couple of glass beads into the petri dish(es) and shake. Be sure to throw away the beads after they have been used.
5. Prepare the petri dishes
  - a. Sun block with SPF 8 onto the lid of one petri dish
  - b. Sun block with SPF 50 onto the lid of another dish
  - c. Put nothing on dish, it will be exposed to UV light
  - d. Put nothing on dish, it will not be exposed
6. Label the dishes with a marker on the side that contains the agar.
7. Cover the dishes with aluminum foil until they are ready to be exposed to the sunlight.
8. After exposing dishes (expect the one that's not supposed to be exposed) place them in an incubator at 37 degrees Celsius. Incubation time may vary, we had ours incubated for twenty-four hours.



## Results:

The yeast is a pale yellow and they are about the size of sand grains. They aren't in large clumps but tiny individual dots. The petri labeled "Nothing" doesn't have any colonies. "No Sun" is covered with colonies. The colonies resemble thin lines made of tiny dots that are very close together. The yeast makes the petri dish look scratchy/grainy. "SPF 50" is also covered with yeast colonies. There about six very light lines that are made up of the colonies. The rest of the colonies are very small dots. They cover the agar in a dust like fashion. "SPF 8" has approximately 592 colonies and each of them are tiny circles that rarely overlap.



## Conclusion:

The experiment confirmed the hypothesis that stated UV sensitive yeast would not grow if exposed to UV light. The petri dishes that were exposed to the sunlight did not grow as many colonies as the petri dish that was not exposed. The dish that had been unprotected did not grow any colonies at all. Since we had stated that the yeast would not grow if exposed to UV light the results confirmed the theory. The sun block had protected the yeast exposed to the sun so the damage done to the yeast's DNA had not been on a large scale. This enabled the yeast to grow. The SPF 50 had more colonies than SPF 8, which means that sun block with more SPF does indeed offer more protection if applied properly. Since the yeast did not form in large colonies like it was supposed to the step that could be changed is number four. The amount of shaking may be reduced and possibly the yeast would grow properly. Diluting the solution is another possibility that some groups chose. This, however, would add another experimental factor into the experiment.