

Lab Instructor _____
Date _____

Name _____
Period _____

Objective: To observe the reproduction of Yeast (*Saccharomyces cerevisiae*) by budding.
Use full sentences when answering all questions.

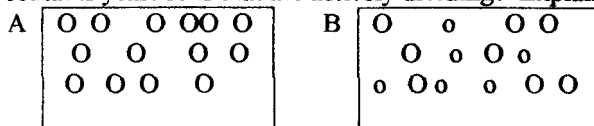
Background

Forms of asexual reproduction include binary fission, sporulation and vegetative propagation. In budding, the nucleus divides evenly, but the cytoplasm does not. As a result, the daughter cell is smaller than the parent cell from which it forms. After it is formed, the small bud grows larger and may break away or it may produce a bud. Budding occurs in yeast and hydra, as well as in sponges and some worms.

Pre-Lab

Read the entire lab description and, if needed, the textbook to answer the following questions.

- In which kingdom are yeast classified? What is the cell type (eukaryotic or prokaryotic), the cell structure (presence/absence of cell wall), and form of nutrition (heterotrophic or autotrophic) of organisms in this kingdom?
- Describe how yeast reproduce.
- Which sample contains yeast cells that are actively dividing? Explain your reasoning.



LAB

Suggested Materials

Preparing yeast culture:

glucose or another form of sugar, water, dry yeast, index card (folded, to be used as a trough for pouring sugar), test tube and test tube stand (or other container), stirring rod

Viewing yeast:

slides, dropper, cover slips, Lugol's iodine solution, compound light microscope

Procedures

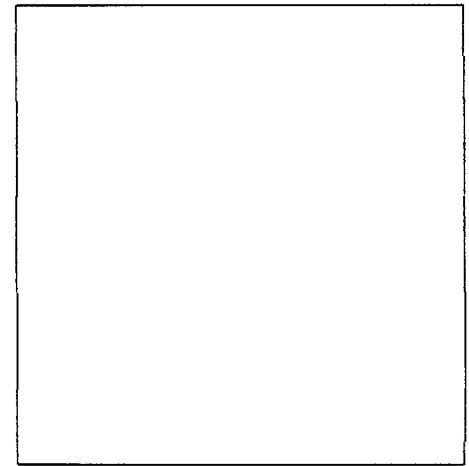
Preparing yeast culture: The yeast culture will be prepared according to the following guidelines, either by the student or instructor, prior to viewing the yeast.

The medium should be a dilute sugar solution, e.g. one part sugar: 10 parts water. You may use molasses, grape juice or other sugar substances. Adding beans may increase the rate of fermentation and reproduction. Add several grains of yeast. Keep the sample warm (25 to 30°C = 77 to 86°F) but out of direct sunlight. Rapidly budding cells are observed within 6-24 hours of preparing the sample, so plan accordingly.

Viewing yeast culture:

- Place a grain of dry yeast in a drop of water on a slide. Carefully put on a cover slip. Crush the grain by using a pencil eraser to push down gently on the cover slip. Examine the yeast with the microscope, under low and then high power. Look for transparent egg-shaped objects. These are yeast cells. Add a drop of Lugol's solution to the slide. The solution stain may help you see the cells more clearly. Save this slide for comparison in procedure 2.
- Remove a drop of prepared yeast culture and drop it onto the slide. Add a cover slip. Examine under low and high power. Look for yeast cells that appear to have smaller cells, called buds, growing on their sides. Add a drop of Lugol's solution to the slide to help you see the cells more clearly.

Procedures may vary. Record below exactly how you prepared the yeast sample (not how you prepared the slide). Be detailed and specific, including measurements, so that a fellow student would be able to reproduce your results.



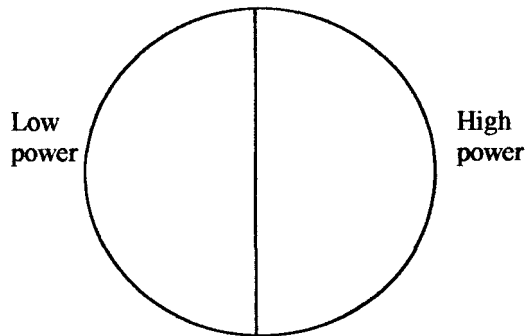
EXTRA CREDIT: Create an original yeast comic here.

Observations

1. Based on the samples you observe under the microscope, sketch yeast under the two different conditions.

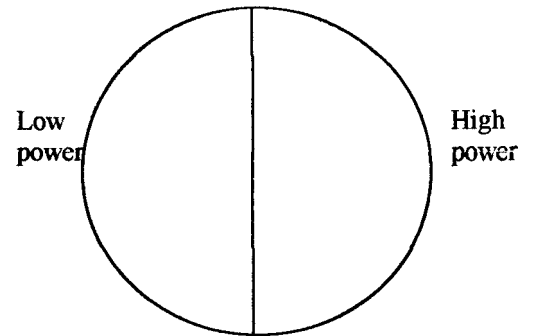
- For each, sketch several of the yeast cells and their buds, if present.
- Label cell wall, nucleus and buds.
- Record the *total* magnification power used for each sketch.

a) Yeast cultured with sugar.



Magnification _____ X _____ X

b) Yeast placed in water without sugar.



_____ X _____ X

2. Compare and contrast the yeast cells under both sets of conditions.

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Conclusions

1. A bud on a yeast cell is actually a new yeast cell that is produced by the division of the nucleus of the single parent cell.
 - a. Once separated, is the bud distinguishable from the parent? Explain.

 - b. Why is budding referred to as an example of asexual reproduction?

 2. Why is it important to grow yeast within a certain temperature range?

 3. a. Why is the sugar medium provided for the yeast?

 - b. How might your observations of yeast be affected by the amount of time the yeast were in a sugar medium?
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4. Yeast can also reproduce by conjugation, a process in which two organisms exchange genetic material. What would be the advantage of budding over conjugation? What are the advantages of conjugation?

Post-Lab Investigate the wonders of conjugating paramecia and spirogyra and create a visual representation of either to show fellow classmates.