



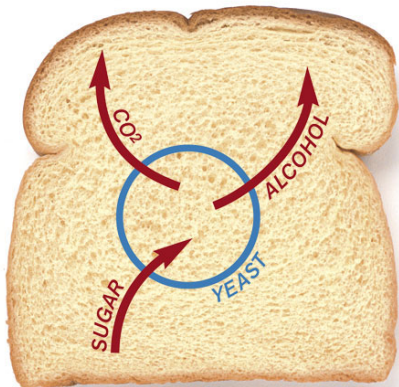
Unit 1

# THE ROLE OF YEAST



**We need gluten for great bread...what else?**

Something to inflate the *gluten balloon*



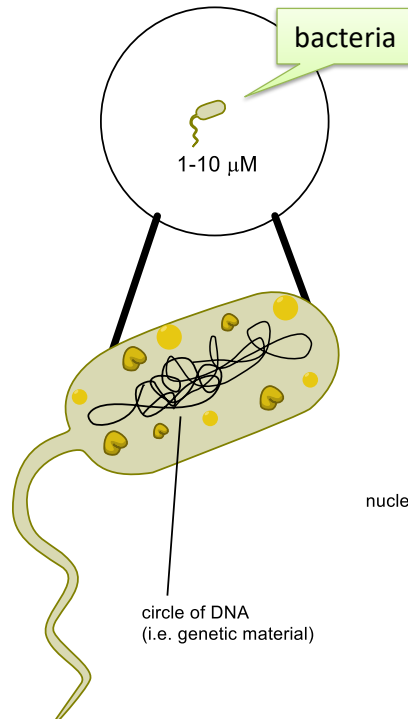


# Yeast are microorganisms

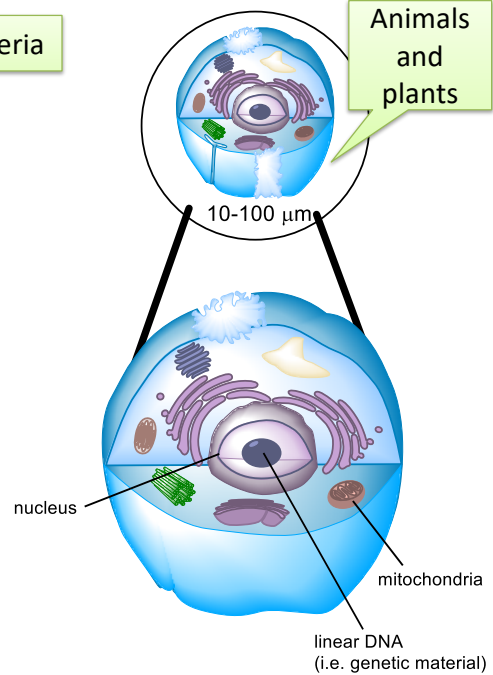
All organisms *are* cells or are *made of* cells

A *cell* can be simply defined as a container of small and large molecules that are essential for the survival of an organism

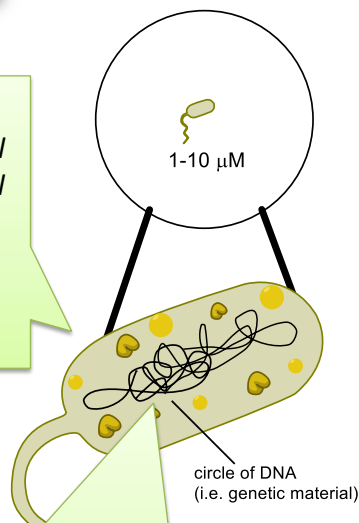
Typical Prokaryotic Cell



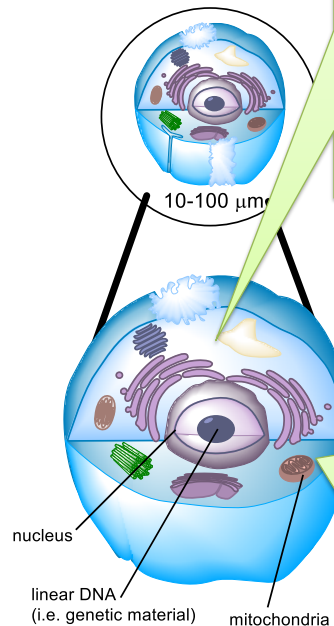
Typical Eukaryotic Cell



Typical Prokaryotic Cell



Typical Eukaryotic Cell



Every cell needs a barrier, called a *cell membrane* or a *cell wall*, that controls the flow of molecules into or out of the cell

Every cell has DNA - the genetic blueprint or hereditary information which is passed from parent cell to daughter cell

Inside every cell, a range of molecules including carbohydrates and 20,000 to 30,000 different proteins, play a key roles cell function

Specialized compartments called *organelles* are found in *eukaryotic* cells; *chloroplasts* and *mitochondria* are examples of *organelles*.

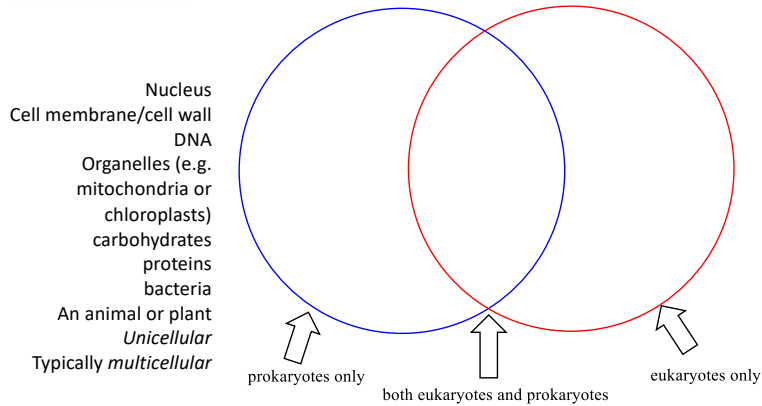


# Time to Check-In

Join with this CODE at [join.nearpod.com](https://join.nearpod.com) or in the app: **GIEWT**

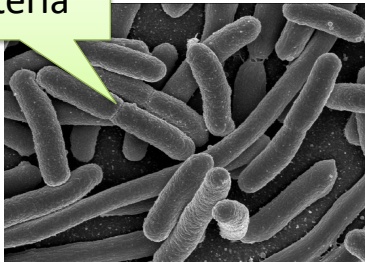
Or via this link:

<https://share.nearpod.com/vsph/LpsBAGKeMu>



# Cells under the microscope

bacteria



Plant cells with chloroplasts

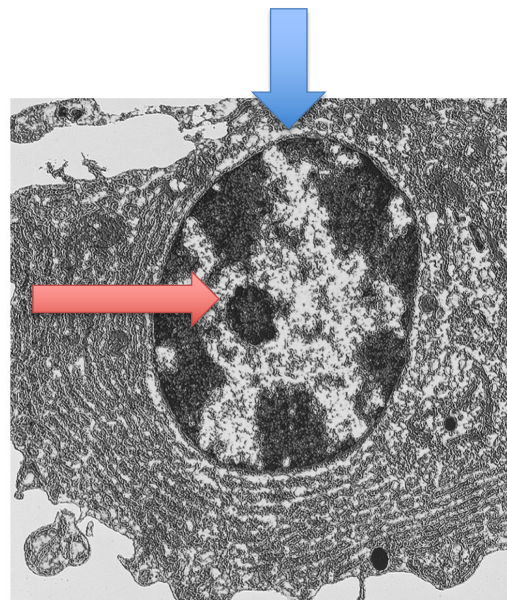
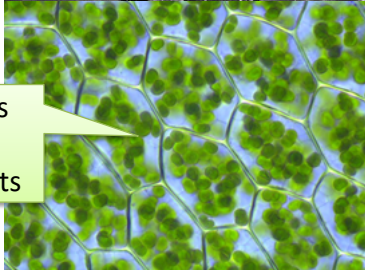
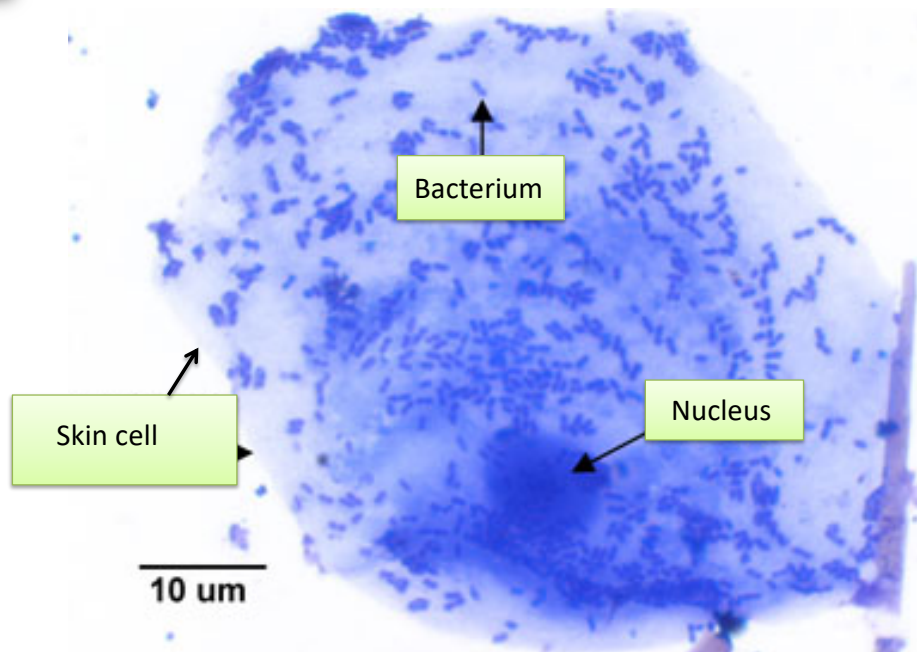


Figure 1-11a part 2 Concepts in Biochemistry, 3/e



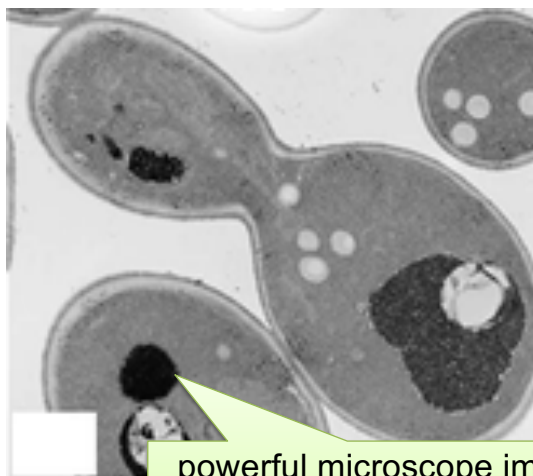
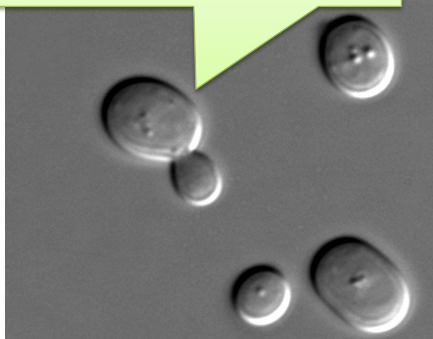
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## Yeast under the microscope

Yeast are small, *unicellular* organisms. The scientific name for baker's or brewer's yeast is *Saccharomyces cerevisiae*

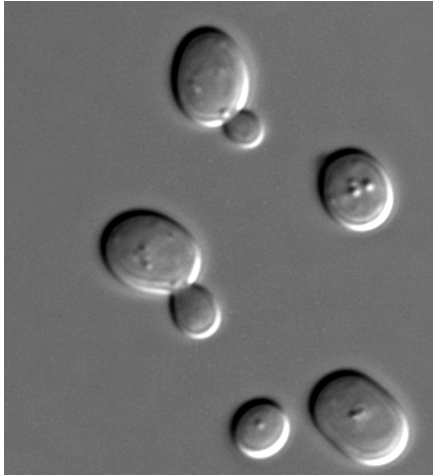
Several *S. cerevisiae* cells visualized under a microscope



powerful microscope image showing the inside of yeast cells (*S. cerevisiae*)<sup>[1]</sup>.



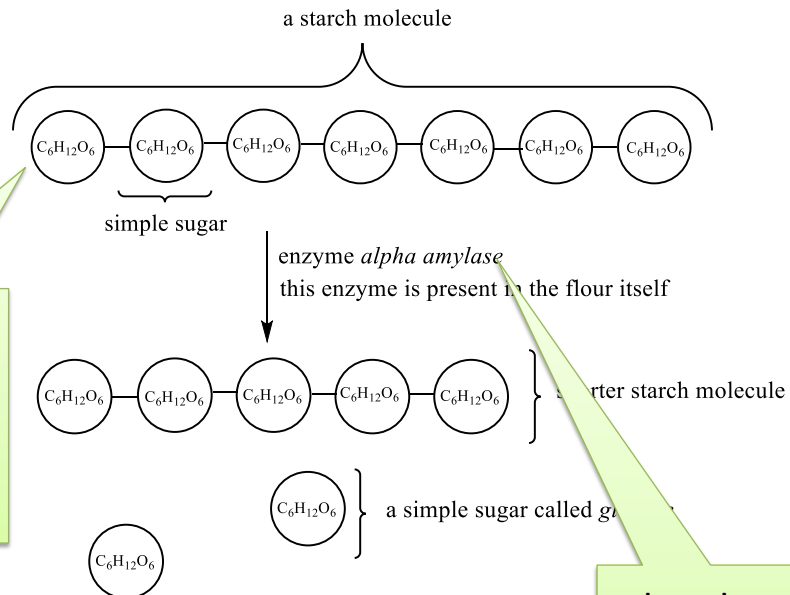
# In what ways is baker's yeast like a human or plant cell (*eukaryotic*) and in what ways is it like an *E. coli* cell (*prokaryotic*)?



Like a **eukaryote**: has nucleus  
 Like a **prokaryote**: small and unimolecular

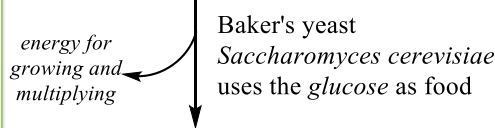


Wheat flour is composed of ~70-80% starch and 7-15% protein



what does the enzyme alpha amylase do?

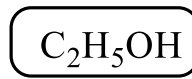
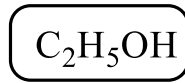
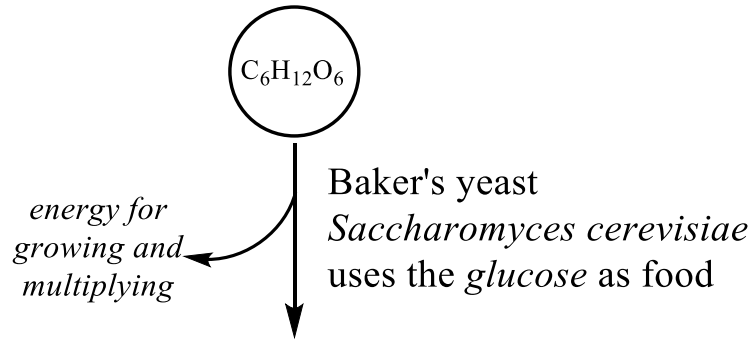
Compare the # of atoms of Carbon before the sugar is eaten by the yeast and after. Do the same for hydrogen and oxygen. What do you notice?



for every molecule of  $C_6H_{12}O_6$  eaten by the yeast, two molecules of  $C_2H_5OH$  (ethanol) and two molecules of  $CO_2$  (carbon dioxide) are produced. This is called **respiration**.



Ethanol and carbon dioxide are merely by products of yeast *respiration*. For yeast, the ultimate goal of consuming *glucose* is to generate energy to power its cellular machinery and eventually grow and multiply.

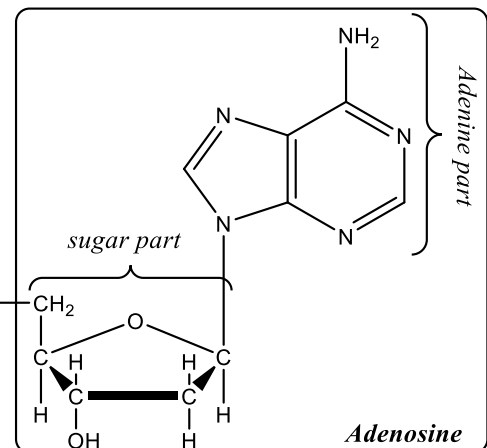
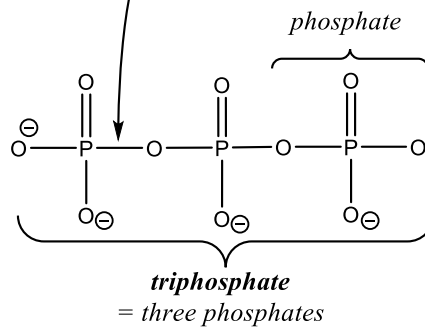


“Proofing yeast” requires mixing yeast with sugar and warm water until a “head of foam” forms. What is causing this foam (a foam is a mass of gas bubbles in a matrix of liquid film)? And why does it “prove” the yeast are ok to use?



## How does the process of consuming glucose produce energy?

This type of covalent bond is special. It is called a phosphodiester bond, and breaking it during a chemical reaction releases energy!

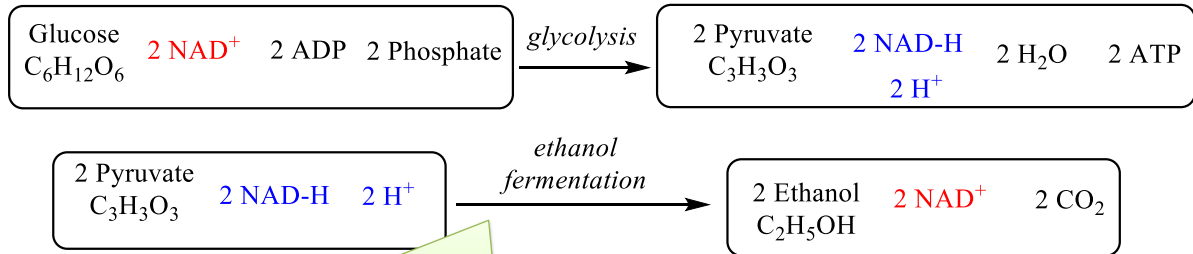


The energy produced is stored as the *high-energy bonds* of ATP – *adenosine triphosphate*. The energy released from breaking the phosphodiester bonds can be used to drive difficult chemical reactions – in this way, the cell generates and uses energy to grow and multiply.



## How does the process of consuming glucose produce energy?

The process of breaking down sugar to make ATP is called *glycolysis* – “glyco-” for *sweet* and “lysis” for *split* or *break*



After glycolysis, the ATP has already been produced. Why do the yeast bother with the ethanol fermentation part?