

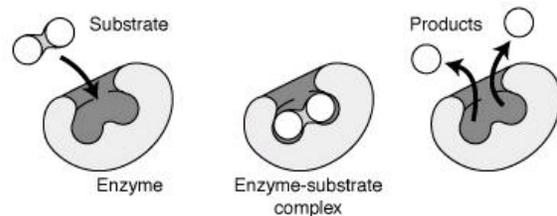
# Simplified microbiology

## How bacteria eat/consume/digest/degrade/convert

Bacteria have special channels in their cell walls and cell membranes which allow, or even assist some molecules to pass through. Once the molecules are inside the cell, they can be broken down into their component parts before being rebuilt into the macromolecules the bacteria needs in order to build and repair its self, or generate energy. Unfortunately for the bacteria, the surrounding environment is not always full of free-floating molecules of the correct sort.

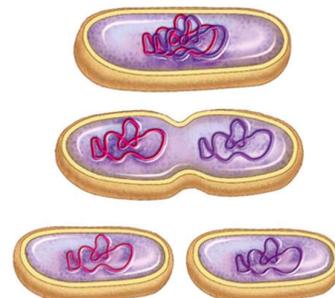
To solve this problem bacteria have evolved the ability of leaking enzymes out into the environment around them. These enzymes then attack specific tissues and molecules (proteases attack proteins, cellulases attack cellulose etc) and break them up into smaller units. These smaller units can then be absorbed by the bacteria through the channels mentioned above.

A common mistake in education is that enzymes “eat” things. Enzymes act like a fork and knife for the bacteria, cutting up their food into smaller pieces for intake. Enzymes are also beneficial in the fact that they break apart grease and grime build up commonly found in drain line systems. However, this practice only transfers the “grease” somewhere else in the system and does not degrade it, only bacteria will.



## How they reproduce

The simplest form of bacterial reproduction is called **binary fission**. Essentially, this is where a bacterium grows to about twice the size of the smallest bacterium and then splits in two. First, the DNA in the cell makes a copy of itself. The two copies separate in the cell and the cell grows two new cell membranes and two new cell walls through its middle, effectively cutting the cell in half, to make two cells. This is asexual (the “a” in front meaning without) reproduction because both the daughter cells have exactly the same DNA as the original cell and only one cell is involved. Bacteria are not quite the



same as the higher animals but they do transfer DNA from one individual to another.

### **How they are modified for specific purposes.**

Some methods of DNA transfer between cells seem almost accidental. When one bacterial cell dies and its cell wall is ruptured, the contents of the cell are released into the environment. This includes the DNA which may be complete or broken into bits. Other nearby bacterial cells can absorb this DNA and add it to their own and in this way they gain extra DNA, if the dead cells DNA codes for a property they do not have, then they have gained this property. This is how bacteria evolve into multi-purpose degraders or single source degraders.

Phase III “Plus” products only use bacteria that are class one, ATCC certified bacterium, which it is non-mutating, non-pathogenic and non-carcinogenic. What does this mean? It means that our bacteria are no more dangerous than yeast for bread, yogurt, beer and wine. In an effort to prevent the word “Bacteria” from getting an unpopular association with disease, we like to use the word “active culture”, which is commonly associated with something good, like yogurt and cheese.

### **Bacteria profile**

- Reproduce Quickly
- Safe, non-pathogenic, naturally occurring in the environment
- Form spores for long term stability
- High level production of multiple enzymes
- Function in or under diverse environmental conditions

### **Basic requirements of the active culture**

Active cultures require three items in order to sustain life; these are water, a food source and oxygen. Environmental conditions are also important for the survivability and growth of bacteria. Temperatures between 85-115 degrees provide optimal conditions as well as a neutral pH level.