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## How Bacteria Grow And Work

By Bill Ronin

Bacteria usually multiply by simple transverse division, a form of asexual reproduction. Recently, conjugation has been observed in certain species of bacteria. A curious form of reproduction observed in bacteria is known as auto-gamy, in which conjugation occurs between two parts of the same cell.

The rapidity with which bacteria grow is almost beyond comprehension. A single bacillus has been known to increase to four millions in half a day. Pasteur saw a single cell grow to ten millions in twenty-four hours.

The growth of germs is chiefly limited by their food supply and the destructive effects of their own excretions. Left to themselves, even with a sufficient food supply and other favorable conditions, bacteria are likely to die sooner or later killed by their own excretory products.

Bacteria consume food, as do higher plants and animals. Some bacteria require an enormous quantity of food. The energy derived from the food manifests itself as heat, which serves the chlorophyll-lacking plant in place of the heat derived from the sunlight by higher plants.

The energy set free by micro-organisms manifests itself in the heating of fermenting liquids.

The heating of green fodder in a silo and of manure in a hot bed are examples of energy released by the activity of bacteria. Another illustration of a similar sort is found in the bacteria that fix nitrogen in the soil. The fixation of nitrogen is accomplished at the expense of the consumption of a large amount of carbohydrate, not less than two hundred pounds of carbohydrate being required for the fixing of one pound of nitrogen.

Bacteria, like all living organisms, require oxygen. Some bacteria, for example those that produce lactic acid, as in the souring of milk, obtain their oxygen directly from the air (aerobes), whereas other bacteria (anaerobes) grow without the presence of air or oxygen, and may even be destroyed by contact with atmospheric oxygen. These bacteria need oxygen, but they are so constituted that they must obtain their oxygen by breaking up compounds containing oxygen.

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Certain bacteria can live and grow either in the presence of free oxygen or excluded from it.

The wonderful activity of microbes in breaking up and destroying organic substances is accomplished by means of diastases or digestive ferments, which they often produce in great quantity. Not only bacteria but yeasts and other living cells behave as ferments when deprived of oxygen.

Bill Ronin enjoys writing about simple science and health. For more information about bacteria, visit the following url:

<http://www.oldsold.com/articles32n/bacteria-2.shtml>

### **Bacteria and Food-borne Diseases**

**By Richard Massey**

#### Types of Bacteria

Bacteria are all around us, in the air, water, ground, on our skin and in our bodies. They are classified in a variety of ways, but for our purpose we can categorize them in a more basic way.

**Harmless bacteria** - Most bacteria fall into this category. They are neither help us nor are harmful to us. These bacteria have a specific purpose, but are not a concerning to us in terms of food safety,

**Beneficial bacteria** - Believe it or not some bacteria are helpful to us. Some bacteria are used in foods to make cheeses and yogurts. And still others live in our bodies to fight of harmful bacteria.

**Undesirable bacteria** - Undesirable bacteria is responsible for food spoilage. This type of bacteria may not make you sick, but they show themselves by the use of odors, sticky or slimy surfaces and discoloration.

**Illness causing bacteria or pathogens** - These are the bacteria that cause most food-borne illnesses. Pathogens do not necessarily leave detectable odors or taste in food. This makes it impossible to tell if food is contaminated by smelling or tasting, or looking at it. The only way to protect yourself from this bacteria is by proper food handling and sanitation.

#### Bacteria Growth

Bacteria simply multiply by splitting in half. Under the ideal conditions, they can double in number every 15 to 30 minutes. This means that one single bacterium could multiply to a million in less than 6 hours.

What do bacteria need to multiply?

**Food** - Some from of food is a basic requirement for bacteria to grow.

**Moisture** - Water is required for bacteria in order to absorb food. Dry foods will not support bacterial

## How Bacteria Grow And Work

growth. As well, foods with very high salt or sugar content make bacteria unable to use the moisture present.

Temperature - Bacteria grow best at warm temperatures between 40 and 140°F. This temperature range is what we call the food danger zone.

Air - Most bacteria require oxygen to grow, but not all. There are some exceptions, one type of bacteria being botulism.

Time - When bacteria are introduced to a new environment, they need time to adjust before they start to grow. This time is called the lag phase and last about one hour.

How is bacteria transferred?

Bacteria are carried from one place to another by being carried. This can happened by peoples hands, coughs, other food, utensils, equipment, water, or pests.

Preventing Bacteria Growth

Now that we know how bacteria grow and are spread; we should be able to prevent food–borne illness by following three simple steps.

- 1.Keep bacteria from spreading by not letting anything that might contain bacteria tough the food. This includes people, dirty equipment, utensils and possibly other foods.
- 2.Stop bacteria from growing by taking away the conditions that encourage growth. The most effective way is to keep food out of the danger zone. Keep foods below 40°F and about 140°F
- 3.Finally kill the bacteria. Most bacteria are killed if they are subject to a temperature above 165°F for 30 seconds. This is how we make food safe by cooking. This heat is also how we sanitize dishes and equipment. Certain chemicals (such as bleach) also kill bacteria. Using sanitizing agents is best way to sanitize counter tops and large equipment.

Chef Richard has worked in some of the finest restaurants in Washington State and is the author of the ebook "Chef's Special". You can find free recipes, informative articles and order the ebook at

<http://www.csrecipes.com>

Bacteria and Food–borne Diseases

10 Critical Ways To A Perfectly Food–Safe Kitchen

Vegetables - Health Food Or Killers

What Causes Bad Breath Anyway?

What Are The Causes Of Yeast Infection In Women?

The Ultimate Rose Garden– Neighbors envy, owners pride!  
File Resource Meter Software  
Super Charged Linking  
How To Win The War Of Internet Marketing  
Brian Garvin's MLM Secrets



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