

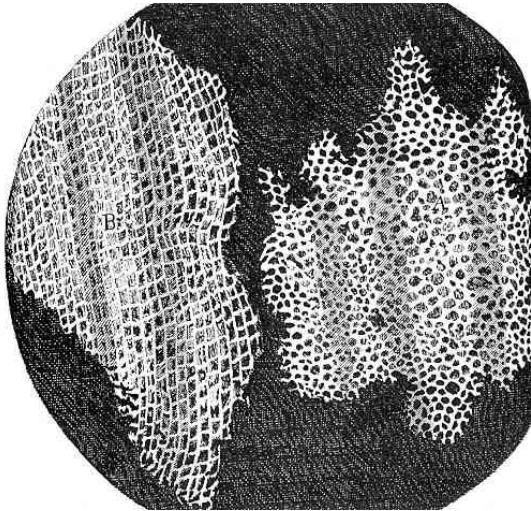
# Life is Amazing

by Dr. Jay L. Wile

## Qualifications

- University Professor From 1990 - 1995
- Helped Develop Indiana's Only Residential High School for Gifted and Talented Students
- NSF-Sponsored Scientist with More Than \$200,000 In Research Grants
- Became Interested in Homeschooling Because of Excellent University Students Who Were Homeschooled
- Currently writes junior high school and high school science courses for homeschooled students
- No Longer a part of Apologia

## The Cell is the Basic Building Block of Life



Robert Hooke coined the term “cell” after looking at cork under the microscope. He saw that the wood was split into tiny sections that reminded him of the cells that monks live in.

It was long thought that cells are simple. Ernst Haeckel (early 1900s) said the cell was a “simple lump of albuminous combinations of carbon.”

## The Hope of The Simple Cell Destroyed

As we got better and better microscopes, we found that the cell was anything but simple!

We now know the cell is much like a city, with sections of organization that deal with production of materials, transport of those materials, production of energy, removal of waste, etc.

To get an idea of the complexity, watch “The Inner Life of a Cell” from Harvard Biovisions.

<http://www.youtube.com/watch?v=yKW4F0Nu-UY>

## **Your Body Contains Trillions of Cells Like That One**

But it contains TEN TIMES as many bacterial cells, and that's a good thing! The bacteria produce chemicals that you need, fight off organisms that want to make you sick, and interact with your immune system.

### **Bacteria and You: A Perfect Match**

There are 1,000 to 1,150 different species of bacteria that are found in human bodies across the world, and a single individual will generally harbor about 160 of them.

If you were to count the number of unique bacterial genes in your body, you would find that they outnumber your own genes by about a factor of 100!

### **What Do These Bacteria Do for Us?**

They help us digest our food: Mice that are deprived of intestinal bacteria have to eat 30% more food just to maintain their weight.

They make chemicals that we need: The bacteria that live in your intestine produce vitamin K, which is essential for good blood clotting.

They compete with fungi and pathogenic bacteria to keep them from colonizing your body.

### **Bioluminescence**

The process by which living things use chemical reactions to glow is called bioluminescence. To get an idea of how prevalent it is in nature, watch

<http://www.youtube.com/watch?v=T2xh9-UPSIU&feature=fvwrel>

<http://www.youtube.com/watch?v=UXI8F-eIoiM>

### **Camouflage Is Used by Many Animals, but Cephalopods Do It Best**

To see how well they use it, watch this video:

<http://www.youtube.com/watch?v=pVIVlq4F3x0>

### **The Archerfish Does Complex Mathematical Calculations to Shoot Its Prey**

See how they do it here:

[http://www.youtube.com/watch?v=S4G\\_MeUUZII&feature=fvst](http://www.youtube.com/watch?v=S4G_MeUUZII&feature=fvst)

## The Pistol Shrimp Has Its Own Stun Gun

You can see how it uses the weapon here:

<http://www.youtube.com/watch?v=XC6I8iPiHT8>

## Geckos Take Advantage of Molecular Forces to Climb Walls

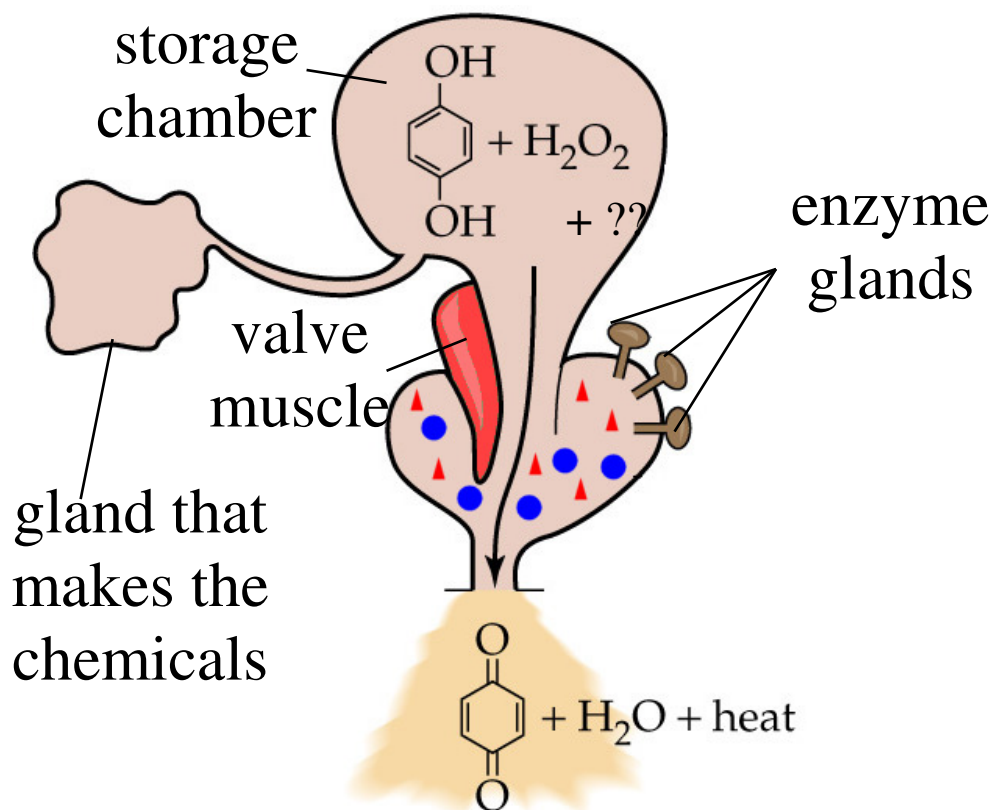
See a discussion of that here:

<http://www.youtube.com/watch?v=OoYeIsSkafI>

## Bombardier Beetles Have Their Own Chemical Weapon

See one use it here:

<http://www.youtube.com/watch?v=j-wVFLucTks>



## **The Lyrebird Can Imitate Nearly Anything**

Hear one in this video:

<http://www.youtube.com/watch?v=VjE0Kdfos4Y>

## **Cleaner Wrasse Are Excellent Examples of Symbiosis**

See them at work in these videos:

<http://www.youtube.com/watch?v=TOC2Qc2Qedw>

<http://www.youtube.com/watch?v=TOa8y95khK8>

## **Symbiosis as shown by the clownfish and sea anemone**

The sea anemone's stingers paralyze fishes. It uses a sophisticated chemical detection system. Since the clownfish masks the chemical detected by the stingers, it can swim freely in them. This provides protection for the clownfish and lures food to the sea anemone.

“Symbiosis is the most relevant and enduring biological theme in the history of our planet.”

– Dr. George D. Stanley, Jr. *Science* **312**:857 2006

## **More Amazing Symbiosis**

*Crematogaster* ants live on *Acacia* trees. The trees provide them with food and shelter, and the soldier ants attack any intruders. The tree's flowers release ANT REPELLANT so the tree can still reproduce.

When humans tried to “protect” *Acacia* trees from large herbivores, the trees became SICKLY because they stopped putting resources into this relationship.

## **Leafcutter Ants Are Farmers and Live In A Three-Way Symbiosis**

These videos explain:

<http://www.youtube.com/watch?v=RH3KYBMpxOU>

## **Ants Also Herd Their Own Domesticated Animals**

See a video of it here:

[http://www.youtube.com/watch?v=43id\\_NRajDo](http://www.youtube.com/watch?v=43id_NRajDo)