

# Science and the Bible

A Course of Study  
by  
Dr. David C. Bossard  
Winter, 2008 (Continued)

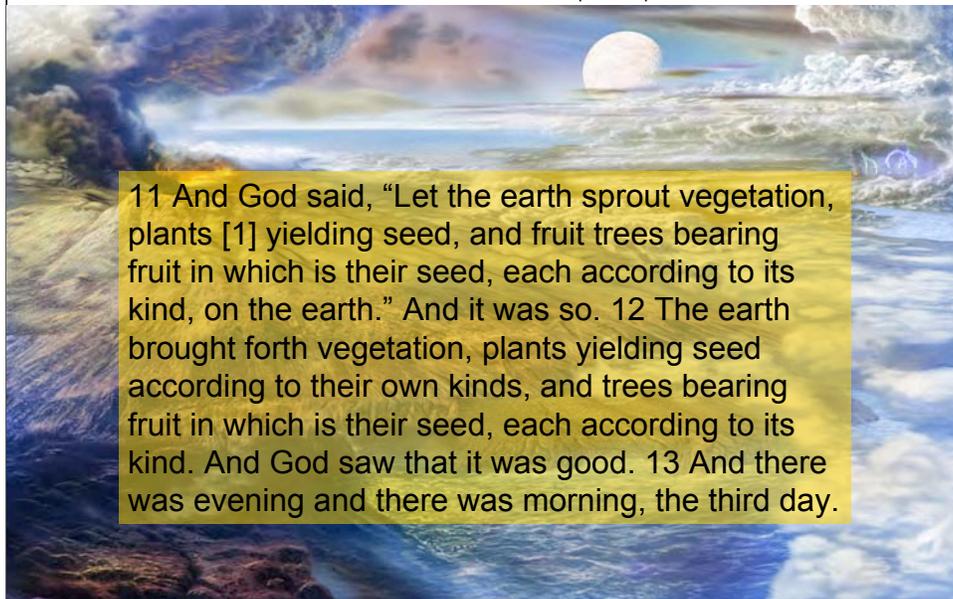


Week 11  
Genesis 1, Day 3b - Plant life (Cont.)

This is week 11 in a course of study in Science and the Bible.

We will continue our discussion of Day 3 and the creation of plant life.

## Genesis 1:11-13, Day Three, Part 2: The Creation of Life



This is the first mention of living matter. But as we noted last week, plants require nutrients that had to be prepared by other living beings. These verses imply that life was already present on earth. The first creation of life had to have already occurred before the second part of Day 3.

We talked a little about what the first life looked like -- it was probably a kind of cyanobacteria, a colonial bacteria that uses photosynthesis to get energy from sunlight.

## Genesis 1:11-13, Day Three, Part 2: The Creation of Life

### Topics:

- The Central Dogma
    - how the genetic code becomes a working cell.
  - The (complex but) essential features of the very first life
    - Photosynthesis
      - Chlorophyll and the complex sugar cycle
    - Nitrogen fixing
      - Nitrogenase enzyme
      - The impossibility that a normal cell could do this!
    - Energy storage battery (TCP)
      - The first "motor"
      - Other motors in living cells.
  - The difference between bacteria and "proper" cells.
  - How cells protect their genetic code against variation
    - difference between bacteria and proper cells
  - The role of variation: The question of "kind"
    - Example of how genetic code can change - Viruses
    - Beneficial and harmful variation.
  - The difference between plants and animals (the ciliates)
    - Body Plans and Skeletal structures; development pathways
  - Inter-dependence of plants and animals
  - Different kinds of plants
    - Plant structure
    - Seeds & reproduction
    - Fruit trees
  - Comments about evolution
    - Built-in capability to "evolve"
    - Limits of evolution -- fossil record evidence of limits.
  - The Closed Cycle Principle of Ecology.
    - No un-renewable food.
    - No un-recycled waste.
- Every waste product of one life form must be food for another life form.

We can't possibly mention all of the important things associated with the creation of life. Last week we said something

about the central dogma and some of the complex processes that even the first living matter had to do. And I'd like to say a bit more about these things today.

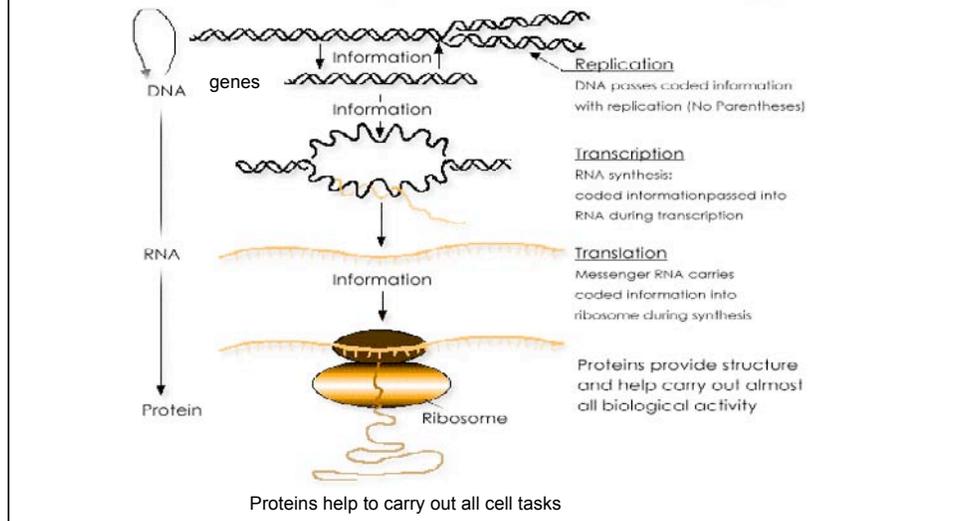
But there are lots of other interesting topics -- we can't possibly do justice to all of them, but just so you know what

Sort of struggle I'm going through in picking and choosing, here are a few of the things that come to mind

# Genesis 1:11-13, Day Three, Part 2: The Creation of Life

Central Dogma = how the genetic code works.

## The Central Dogma of Molecular Biology



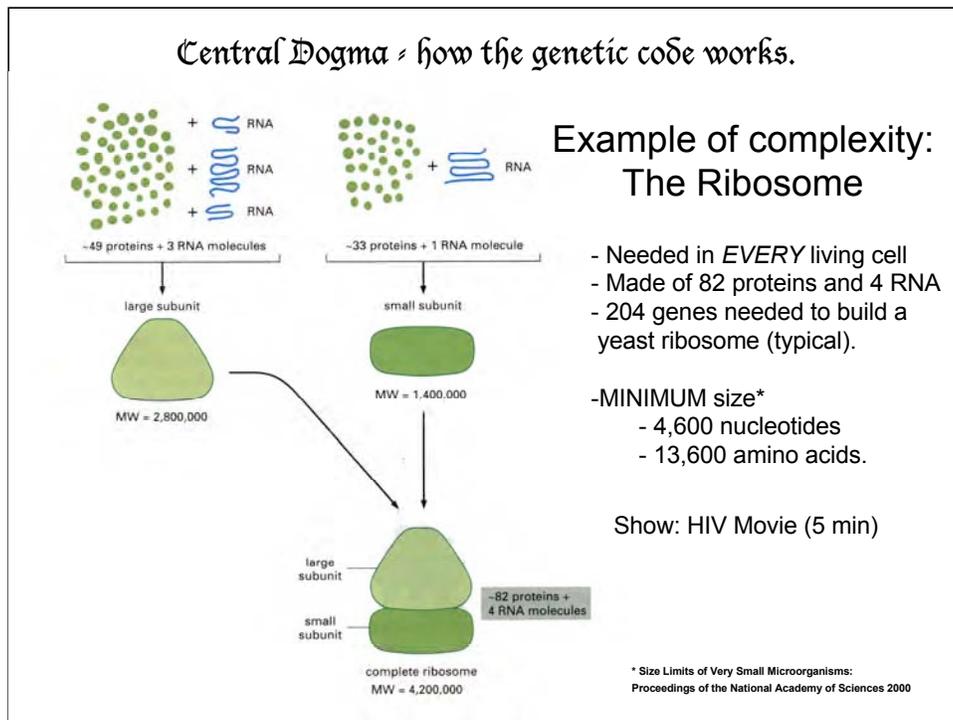
The DNA records everything needed to build the cell and make it work. This information is recorded

In genes. The work is carried out by proteins. The proteins may be part of a cell structure, or they may

be *catalysts* that are needed to build cell structures or help them to function. (A catalyst is something that

has to be present to do something but isn't itself used up in the process -- an example of a catalyst is the

ribosome that is needed to build proteins).



The ribosome is probably the most complex part of the central dogma.

It is a complex of two molecules which envelope the messenger RNA like a hamburger roll.

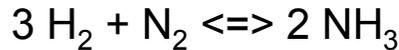
The HIV movie (5 minutes) shows an animation of the central dogma. (HIV\_Replication.flv).

"Wonders of a tiny cell" (2.5 minutes) shows central dogma

## Other Activities of the First living cells complex but essential

### - Nitrogen fixing

- Nitrogenase enzyme
- The impossibility that a normal cell could do this!



- This is almost impossible to do
  - No plant or animal can do it.
    - Only about 200 bacteria species can!
  - Yet it is essential to life.
- Only ONE biological enzyme can do it: Nitrogenase
- Works at room temperature!
  - VERY slow - 1 molecule per 1.2 seconds  
(a typical cell needs millions!)
  - VERY much energy needed - Cell can't do anything else!
- Only ONE Industrial process can do it: The Haber process
- Works at about 3000 psi and 930° F.

From Huxtable, *Reflections: Fritz Haber*.

"No animal or plant is capable of carrying out the reduction of nitrogen."

"The total world supply of nitrogenase could fit in a large bucket."

"The process is so difficult, consuming such a high percentage of the energy use of the

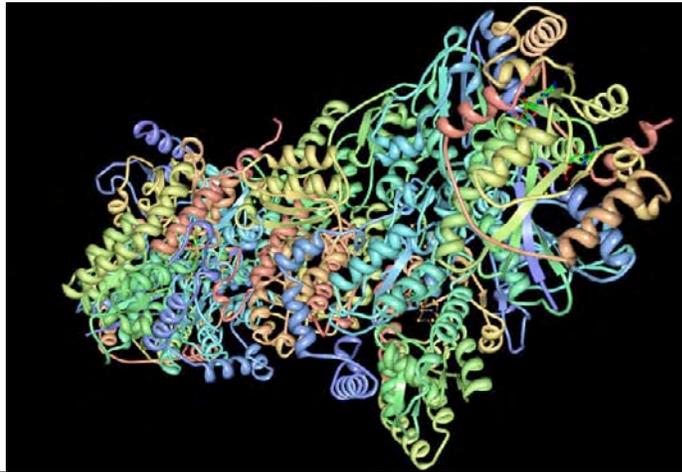
bacterium, that nitrogen-fixing bacteria rely on other organisms to supply the glucose they need."

From David W. Wolfe, *Out of Thin Air - Nitrogen Fixers*

**Other Activities of the first living cells**  
complex but essential

**-Nitrogen fixing**

-Nitrogenase enzyme has 24,190 atoms!



**PDB Simple Viewer of nitrogenase**

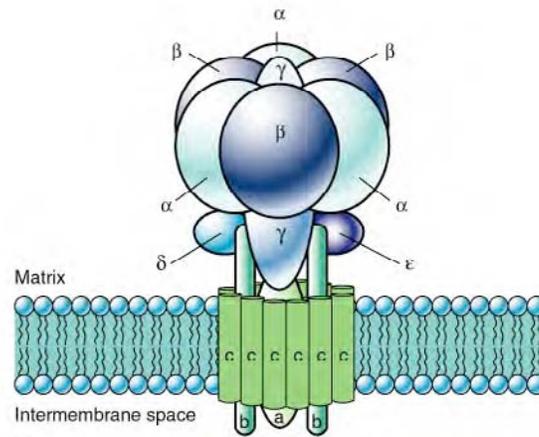
<http://www.rcsb.org/pdb/cgi/explore.cgi?job=graphics&pdbId=1N2C&page=&pid=2300952018024&opt=chime>

## Other Activities of the first living cells complex but essential

- Photosynthesis
  - Chlorophyll and the complex sugar cycle

## Other Activities of the First living cells complex but essential

- Energy storage battery (ATP)
- ATP Synthase The first "motor"



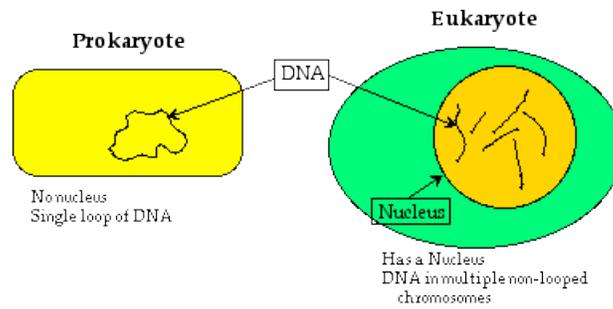
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The Cell's Energizer Bunny -- ATP  
Adenosine tri-phosphate.

ATP Synthase -- the world's first rotary  
motor.

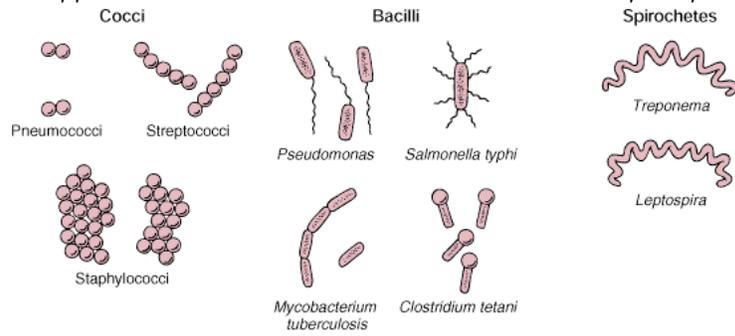
## The Difference between bacteria and "proper" cells



Bacteria cannot have many shapes because they don't have internal structure

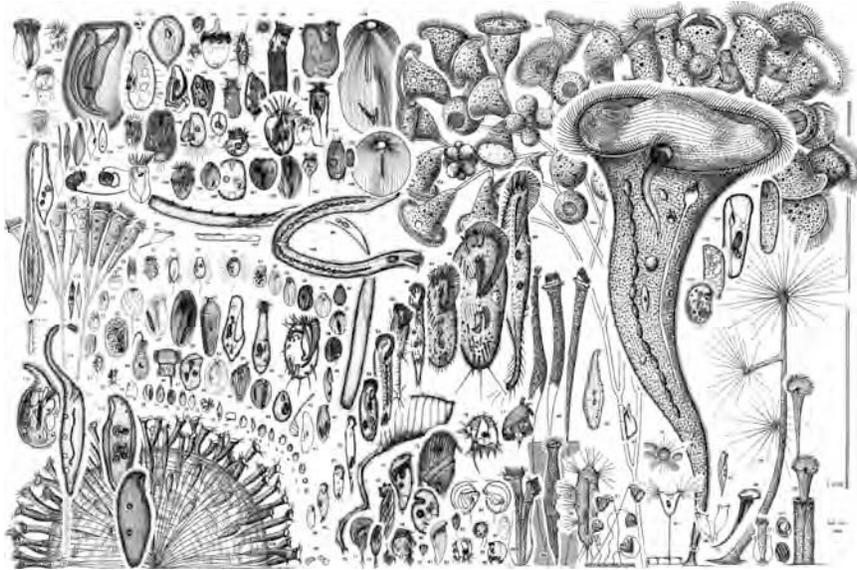
Proper cells can have a broad range of shapes because they have internal structure -- filaments, etc.

# The Difference between bacteria and "proper" cells



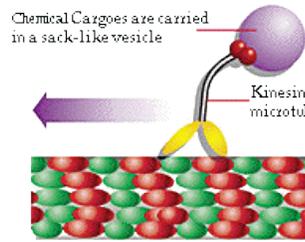
Bacterial shapes

## The Difference between bacteria and "proper" cells

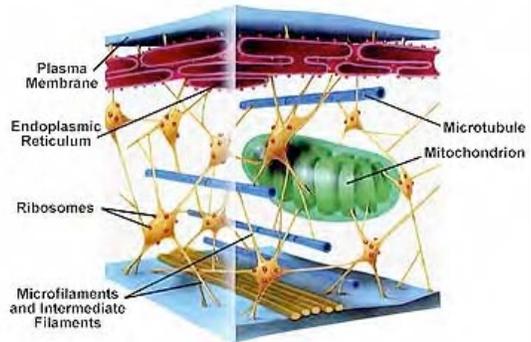
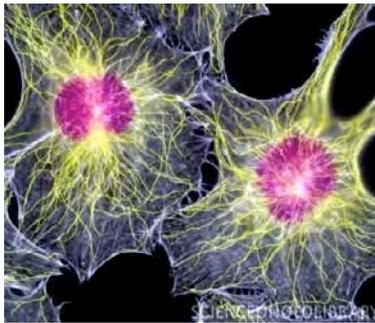


Ciliate Shapes

# The Difference between bacteria and "proper" cells



Kinesin Motor and cytoskeleton



## Genesis 1:11-13, Day Three, Part 2: The Creation of Life

Topics:

- How cells protect their genetic code against variation
  - difference between bacteria and proper cells
- The role of variation: The question of "kind"
  - Example of how genetic code can change - Viruses
  - Beneficial and harmful variation.

DNA\_REPAIR.flv

# Genesis 1:11-13, Day Three, Part 2: The Creation of Life

Topics:

- The difference between plants and animals (the ciliates)
  - Body Plans and Skeletal structures; development pathways

The role of homeobox genes

All animals have homeobox genes.  
Variations in hox genes may aid in survival.

## Genesis 1:11-13, Day Three, Part 2: The Creation of Life

Topics:

- Inter-dependence of plants and animals

Bees and flowering plants  
Many other examples

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## Genesis 1:11-13, Day Three, Part 2: The Creation of Life

### Topics:

- Different kinds of plants
  - Plant structure
  - Seeds & reproduction
  - Fruit trees

### Plant structure --

- a. determined by osmotic pressure
- b. determined by cellulose cells
- c. determined by woody cells



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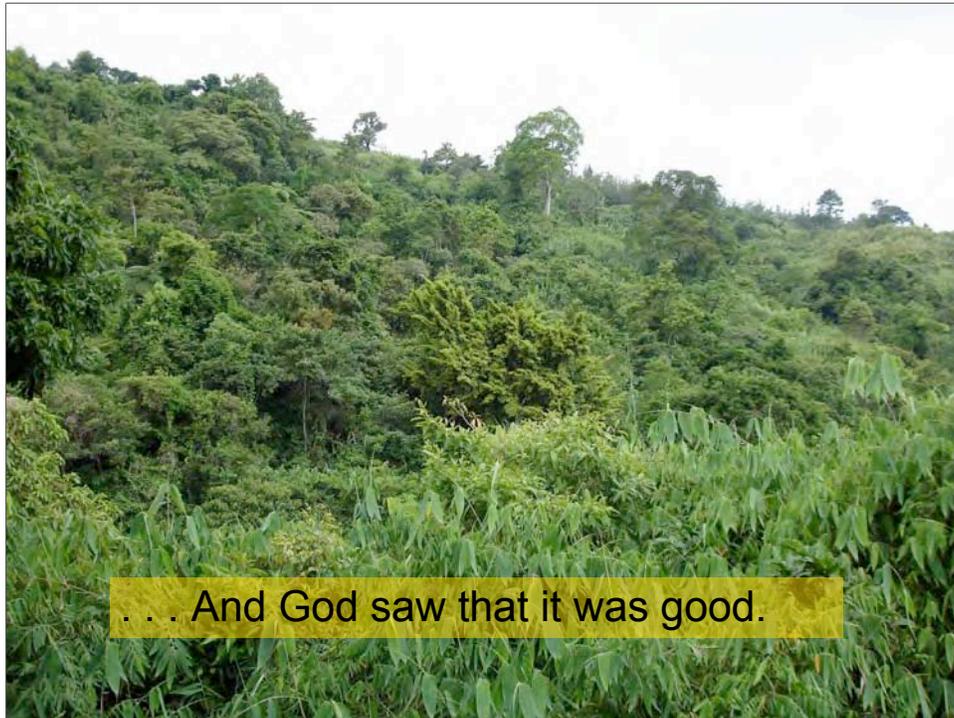
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. . . And God saw that it was good.

In summary, Day Three was preceded by the creation of bacteria, which are implicit in the Genesis narrative, but which are not specifically mentioned.

In Day Three, God prepared the earth for the future population by animals, which could feed on the plants.

It is pretty clear from the account that Moses had in mind the vegetation on the land. However there was of course a parallel preparation of the oceans as well. The oceans were also filled with food that would provide food for the animals to

## Genesis 1:11-13, Day Four Clearing the Atmosphere

14 And God said, "Let there be lights in the expanse of the heavens to separate the day from the night. And let them be for signs and for seasons, and for days and years, 15 and let them be lights in the expanse of the heavens to give light upon the earth." And it was so. 16 And God made the two great lights—the greater light to rule the day and the lesser light to rule the night—and the stars. 17 And God set them in the expanse of the heavens to give light on the earth, 18 to rule over the day and over the night, and to separate the light from the darkness. And God saw that it was good. 19 And there was evening and there was morning, the fourth day

St Augustine made the point that the Bible views things from the perspective of a person standing on the earth. Day four is a prime example of this.

The basic problem is that the sun was pretty clearly around since Day 1, and so these verses don't logically describe the creation of the sun, moon and stars. The view of Dr. Newman and many others is that this is the time that the atmosphere cleared up.

## The Acts of Forming and the Acts of Filling

Dallas Cain, *And It Was So*, Chapter 6

<i>Forming</i>	<i>Filling</i>
<p style="text-align: center;"><b>Day One</b></p> <p style="text-align: center;"><b>God said, "Let there be daylight"</b></p> <p>and there was daylight . . . and God separated the daylight from the darkness to create day and night.</p>	<p style="text-align: center;"><b>Day Four</b></p> <p style="text-align: center;"><b>God said, "Let there be lights in the expanse of the sky . . ."</b></p> <p>God had made two great lights . . . and the stars. He had given them in the expanse of the sky.</p>
<p style="text-align: center;"><b>Day Two</b></p> <p style="text-align: center;"><b>God said, "Let there be an expanse between the waters to separate water from water."</b></p> <p>God separated the waters below from the waters above to create the oceans and the sky.</p>	<p style="text-align: center;"><b>Day Five</b></p> <p style="text-align: center;"><b>God said, "Let the water teem with living creatures, and let winged creatures fly in the sky."</b></p> <p>And God created the creatures of the sea and the creatures of the sky.</p>
<p style="text-align: center;"><b>Day Three</b></p> <p style="text-align: center;"><b>God said, "Let the water under the sky be gathered together to let the dry land appear."</b></p> <p>And it came to be so. God called the dry "land" and the gathered waters he called "seas."</p> <p style="text-align: center; margin-top: 20px;"><b>God said, "Let the land produce vegetation."</b></p> <p>The land produced vegetation.</p>	<p style="text-align: center;"><b>Day Six</b></p> <p style="text-align: center;"><b>And God said, "Let the land produce living creatures."</b></p> <p>God made the wild animals and livestock and all the creatures that move along the ground.</p> <p>Then, as a special subset of the land-dwelling creatures:</p> <p style="text-align: center; margin-top: 10px;"><b>God said, "Let us make humans in our likeness."</b></p> <p>So God created humans in his likeness.</p> <p style="text-align: center; margin-top: 10px;"><b>God said, "And to all creatures that have the breath of life in it I give every green plant for food."</b></p> <p>And it came to be so.</p>