Origins Insights

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April 2004

The Creation of Bacteria and Viruses: From God In The Beginning?

A Discussion Based on The Organosubstrate of Life: A Creationist Perspective of Micobes and Viruses as presented by Joe Francis at ICC #5 2003 [Part II]

by Bob Harsh

Evolutionists contend that the first life forms were simple and more complex forms evolved from them. Many people have the erroneous idea that bacteria are simple organisms. Let us get one thing straight.

There are no simple organisms. The evolution of bacteria is statistically impossible!!!

But what do creationists understand about microbes? Were pathogenic organisms "created" in the beginning? It would be helpful to read Part I of this article before continuing with Part II. Part I may be found at the CSF web site www.csfpittsburgh.org/2004OI/mar04.pdf.

What kinds of purposes do microbes serve? Microbes were designed as parts of creation:

-to be abundant
-to be ubiquitous
-to form symbiotic communities
-to associate symbiotically with macro-organisms
-to free elements from the inorganic world
-to cycle elements in the biological world
-to cycle water
-for bioremediation

Microbes are designed to be abundant. According to Dr. Francis:

The total number of viruses is 1×10^{31}.
The total number of known bacterial species is 5000 with 1×10^{7} predicted species.
The total number of known fungal species is $1x\ 10^{5}$.
The total number of known protist species is 2×10^{5}.
The total number of known lichen species is $>1.3 \times 10^{4}$.
The total number of known viral species (?) is

Inside

CSF Meeting
Tuesday, 7:30 PM, April 20, 2004

Mars Alliance Church, Rt. 228

Plate Tectonics and Creationism

This month Phil McCaffrey will be speaking on John Baumgardner's Catastrophic Plate Tectonics. Phil will help us to answer several questions of importance to the study of origins. Among these are: Was there really a flood that covered the entire earth? What evidence do we have now that can point to such an event? How does our understanding of the continental plates help us to understand such an event?

Join us for this interesting presentation.

Microbes are designed to be ubiquitous. They live everywhere!

Microbes and viruses are found thriving in;

- **-hot springs**
- **-acid laden caves**
- **-salt marshes**
- **-radioactive environments**
- **-mountain tops**
- **-surface of desert floor**
- **-subterranean oil fields**
- **-polar ice caps**
- **-rubber stoppers in sterilized bottles**
- **-antimicrobial hand-soap**
- **-intercellular and intracellular environments**
- **-degrading conditions of digestive systems**

Lichens can live on bare rock and endure extreme heat and cold. They serve as substrate for other organisms and can even make soil.

The atmosphere contains an abundance of bacteria. In the ocean, 50-70% of the biomass is bacteria.
There are 5×10^7 viruses/ml in sea water.

In the lithosphere 1 gram of topsoil contains:

- -10 billion bacteria
- -25,000 algae
- -100,000 fungi

An adult human body contains around 70 trillion cells. It is incredible that an adult human body hosts over 100 trillion bacteria !!!!!You are more bacteria than human. Just kidding!

Some bacteria can form a colony that looks like a multi-cellular organism. It is obvious that the individual cells can communicate detailed information. They can exchange genetic materials. Each has internal ability to respond by altering itself and others by emission of signals to associated bacteria cells. One biologist described this ordered association this way,

> These features indicate that a stressed colony turns into a genetic network, which is the highest level of colony cooperation. To emphasize that the network is composed of agents I refer to it as a genomic web. I further assume, that in order to establish the genomic web, the bacteria produce (or activate) special cybernators enhancing the efficient and sophisticated genomic communication. Once formed the genomic web is a "supermind" relative to the individual genome.
> [http://star.tau.ac.il/~inon/wisdom1]

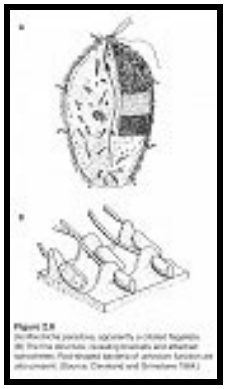
So individual organisms combine to form, what appears to be, a multi-cellular organism with division of labor, among the various cells.

Microbes are designed to form symbiotic communities. Dr. Francis asks, "Does unicellular life truly exist?" Many pond organisms associate with symbionts. Algae lives inside the paramecium. The algae produce food for the *Paramecium* and the *Paramecium* provides a habitat for the algae. This beautiful relationship works out nicely when the *Paramecium* is in the light but when it is in the dark for extended periods of time, the algae become a burden and are expelled. If these were fixed intracellular symbionts perhaps they would be detrimental to the organism during life in the dark.

Biofilms are composed of populations or communities of microorganisms adhering to environmental surfaces. These groups of bacteria produce an extra-cellular polysaccharide film that encases the whole colony.

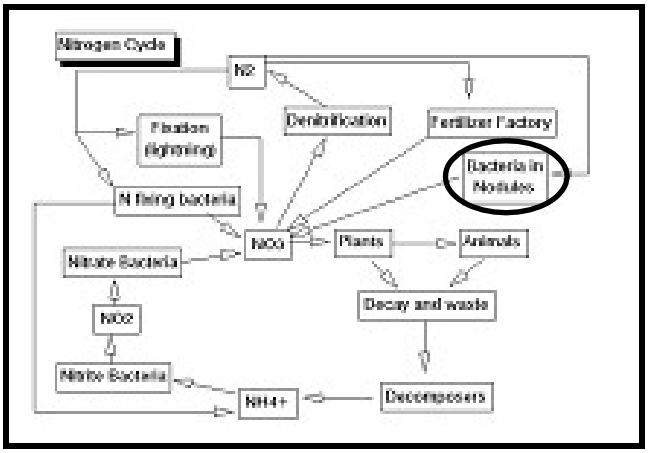
Quorum Sensing
Cell-to-cell signaling is involved in biofilm formation. At sufficient population densities, these signals reach concentrations required for activation of genes involved in biofilm production. Dental plaque is a biofilm. Cell-to-cell signaling has recently been demonstrated to play a role in cell attachment and detachment from biofilms. Researchers showed that certain dental plaque bacteria can modulate expression of the genes encoding fimbrial expression (*fimA*) in *Porphyromonas gingivalis*.

How Lichens Grow
Lichens are a mutualistic relationship between certain species of algae and particular species of fungus. The algae produce the food for the fungus. Fungi absorb their nutrients from the algae partner and provide the environmental conditions to help the algae to grow. Lichens retain moisture and can absorb 35 times their weight in moisture! **They can form soil crusts that: prevent erosion, fix nitrogen, provide carbon, food source, and provide substrate for growth of plants.** *Mixotricha paradoxa* is a ciliated flagellate protozoan] that has permanently attached spirochete bacteria. The protozoa provide nutrients for the bacteria and the bacteria help with protozoa locomotion.



Microbes necessary for Nitrogen Cycle

All plants must have nitrogen. Air consists of 78% nitrogen but plants must take in their nitrogen in the useable form, nitrate. The bacteria found associated with legume plants are the primary converters of useless nitrogen into useable nitrate. *Rhizobia* is an example of this type of useful bacteria.



The sequence of events for how these bacteria work is quite interesting:
1-*Rhizobia* are chemotactically attracted to root hairs.
2- The *Rhizobia* attach to the cell wall of the plant's root hairs.
3- Tryptophan is secreted by the root hair.
4- Tryptophan is transformed by the *Rhizobia* to indoleacetic acid (IAA). This plant growth hormone causes the root hair to curl or branch around the attached *Rhizobia.*
5- The *Rhizobia* secrete an enzyme that softens the root hair cell wall.
6- *Rhizobia* gain entry into the root hair cell.
7- The root hair cell nucleus directs the development of the infection thread. 8- The *Rhizobia* travel down the tube and infect cortex cells.
9- The *Rhizobia* change their shape and commence nitrogen fixation.

Leaf-cutter ants and symbionts
Certain species of ants harvest leaves, bring them to the nest, inoculate the leaves with a specific species of fungus, and they grow the fungus. Plant material and dead insects cannot be digested directly by the ants, but the fungus has enzymes which allow it to break down these materials into a form that it can use for its own growth. The fungus garden is an efficient factory for turning indigestible material into food that can be used by the ant colony. The fungus grows and produces special nutritional bodies called **gongylidia**, which are eaten by the ant. The ants can digest the gongylidia relatively easily, and so use them for their own growth and development.

When new queens leave the nest to start a new colony they take with them some of the fungus from their old colony. This means that the fungus in the new nest is genetically identical to the fungus in the nest in which the queen was reared.

A second type of fungus attacks and destroys the good fungus.
Solution: The ants carry on the surface of their bodies, a type of bacteria that produces antibiotics that kill the parasitizing fungus!
EVOLUTIONISTS SAY THIS RELATIONSHIP HAS GONE ON FOR 50 MILLION YEARS.
PROBLEM: WHAT HAPPENED TO RESISTANCE TO THE ANTIBIOTIC?

Some insects house fungus in their bodies. When they lay their eggs they inoculate the outsides of their eggs with the fungus that grows to surround the eggs and is food for the baby insects after they hatch.

Some bugs have special structures designed to associate symbiotically in the digestive system. They have special structures in the esophagus that harbor and release bacteria to aid with digestion.

In other insects, the gut symbionts are expelled by the mother insect.

> Regularly formed, bacteria filled capsules are sent first to the hindgut and then expelled from the body. The eggs are laid in two lines, diagonal to the longitudinal axis of the animal, hence arranged like spikes. Through constant groping movements of the abdomen, the animal keeps oriented with regard to the deposition. When the first eggs are laid, it places close to the eggs in the angle formed by them, in the longitudinal axis of the spike, a small oval formation with a brownish content, the first of the bacteria-filled capsules. After a short pause the 3rd and 4th eggs appear and another capsule is placed. This activity continues until ten or twelve eggs have been deposited.
>
> When the larvae finally break the cover of the eggshell with their egg teeth, they undergo the so-called rest period, which in actuality is spent in sucking out the capsules. After resting for 10-15 minutes they move about on the deposit in greater and greater agitation, palpitating the eggs with their rostra, making deep punctures between them. Surprisingingly quickly they come upon one of the hidden packages of symbionts. They suck unceasingly for 30-105 minutes. The capsules can be found empty and punctured. Soon the symbionts can be found in the larval gut. [Francis]

Even the morphology of symbionts change when they are actively associated with their partner. Fungus by themselves look different when they are associated with another organism as a symbiont.

Tube worms and Bacteria

The tube worms of thermal vents *Riftia pachyptila* house extensive endosymbiotic bacterial populations. The bacteria live within specialized tissues. The worm absorbs oxygen, hydrogen sulfide, and carbon dioxide through its gills and transports these compounds to the bacteria. The bacteria convert these inorganic compounds into organic compounds that support the growth of the tube worms.

Riftia pachyptila can reach 1 -2 meters in length and 10-15cm in diameter and contains very large populations of endosymbiotic bacteria.

The adult worm lacks a mouth opening, anal vent or a digestive tract. Over half of the animal's volume consists of tissue harboring endosymbiotic bacteria. This organ is called the trophosome. They have a hemoglobin compound capable of transporting oxygen, hydrogen sulfide and carbon dioxide between the gills and trophosome. Hydrogen sulfide attaches irreversibly to the hemoglobin of other animals and renders it unsuitable for oxygen transport

A fascinating example of organisms that were designed to associate symbiotically with macro-organisms is bioluminescent bacteria used by many sea creatures. Flashlight fish have a specialized organ that houses bioluminescent bacteria to attract prey and avoid predators. The blood supply to flash organ supplies nutrients for bacteria.

Many animals house intestinal symbionts. They are prevalent in many organisms, especially ruminants like cows and deer. One of the first behaviors of the doe is to regurgitate some digestive tract fluids that the fawn swallows. This action inoculates the fawns with their intestinal symbionts.

Another obligatory association is termites and a protozoan, *Trichonympha.* Termites eat wood but cannot digest the cellulose. *Trichonympha* live in their guts and digest the cellulose forming sugars and acetate. The acetate is taken up by the termite gut and serves as an energy source for the termite.

Birds known as honey guides eat beeswax but cannot digest it. Bacteria and yeast breakdown beeswax and the birds can obtain nutrition from beeswax.

Microbes are absolutely necessary for the health of humans. We host over 400 beneficial species that provide nutrients, form waste, alarm immune system and are required for proper digestive system development.

"Bacteria that live in the intestine appear to provide mammals with several necessary services for healthy development. Unraveling the molecular foundations of these relationships may provide new ways of preventing or treating a variety of diseases." [Stappenbeck TS, Hooper LV, Gordon JI. Developmental regulation of intestinal angiogenesis by indigenous microbes via Paneth cells Proceedings of the National Academy of Sciences, November 5, 2002]

We will be revealing even more information about how microbes fulfill important roles they were created for, in a future issue of *Origins Insights.*

CSF Dues: Are You Current?

Check the date on the mailing label of this issue. This date shows the last time your dues were paid. Your CSF board is asking that you bring your dues status up-to-date by sending in your payment of $15. Yes, we have been remiss lately in sending out reminders. So here's the deal. If you are behind in your dues, sending in one years payment of $15 will bring your dues up-to-date regardless of your past due status.

As you know CSF is a non-profit organization and the nominal dues are used to cover the cost of mailings. Regular membership includes the following benefits:

- The CSF monthly newsletter, Origins Insights.
- Unique availability of the top creation science books.
- A 10% discount when purchasing from CSF Books, whether books, audio or video tapes, or other materials.
- An invitation to attend the CSF Technical Talks and other special events.
- General fellowship with other creationists at the monthly meetings.
- A reduced price for the International Conference on Creationism series proceedings.
- Opportunities to present to the fellowship personal investigations into creation science.
- Eligibility to run for office on the CSF Board.

Dues can be sent to:
Reid Moon
Creation Science Fellowship
P.O. Box 99303
Pittsburgh, PA 15233-4303

Register Online for the Christian Leaders Meeting

The Pittsburgh Answers in Genesis seminar is now only months away. An important prelude to the November seminar is the Christian Leaders Meeting. The CLM is a private breakfast with Ken Ham for Pastors and teachers being held on August 5, 2004 at the Sheraton Cranberry. Ken will present why Genesis is so important to the Christian faith. Your pastors can register online at www.csfpittsburgh.org or by email at clm@csfpittsburgh.org. This event is **free** but registration is required.

CSF 2004 Calendar

- **April 20 – Phil McCaffrey**
  Plate Tectonics and Creationism
- **May 18 – Creation Adventure Video**
- **June 15 – Biblical Geology, Presenter to be announced**
- **July 20 – Dr. Steve Rodabaugh**
  Job's Park
- **August 17 – Dr. Jerry Bergman**
  Flood Myths
- **September 25 – Carnegie Museum of Natural History Tour**
- **October 19 – Dr. Lionel Dahmer**
  New Evidence That The Decay of Radioactive Materials Has Not Been Constant At Certain Times In The Past.
- **November 19 and 20 – Ken Ham**
  Answers in Genesis Seminar
  David L. Lawrence Convention Center

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