

BEYOND THE NEO-DARWINIAN EVOLUTION SYNTHESIS

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GOD THE CREATOR

From the first chapter of Genesis we learn that one of Gods purposes was to create living things on Earth. From Genesis 1:11 Then God said, Let the Earth put forth vegetation: plants yielding seed and fruit trees of every kind on earth that bear fruit with the seed in it. From Genesis 1:21 So, God created the great sea monsters and every living creature that moves, of every kind, with which the waters swarm, and every winged bird of every kind. From Genesis 1:24, And God said, Let the earth bring forth living creatures of every kind: cattle and creeping things and wild animals of the earth of every kind. And from Genesis 1:27, So God created humankind in his image in the image of God he created them; male and female He created them.

We suggest that God accomplished this purpose through the process of evolution

Neo-Darwinian Evolutionary Synthesis

Epigenetics

Genomic Evolution - Symbiogenesis

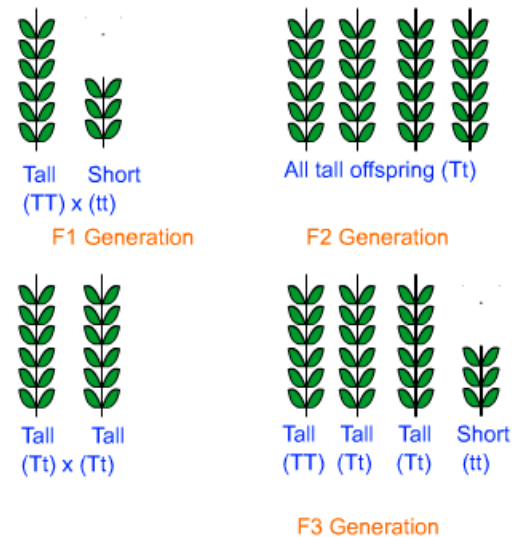
Niche Construction theory

Evolution and Faith

QUICK REVIEW OF NEO-DARWINIAN SYNTHESIS



Neo-Darwinism, also called the modern evolutionary synthesis, generally denotes the integration of Charles **Darwin's theory** of evolution by natural selection, Gregor Mendel's **theory** of genetics as the basis for biological inheritance, and mathematical population genetics.



IN SUMMARY, NEO-DARWINIAN EVOLUTION

- A. RECOGNIZES THAT “GENES” ARE RESPONSIBLE FOR THE INHERITANCE OF CHARACTERISTICS**
- B. RECOGNIZES THAT “POPULATIONS”, NOT INDIVIDUALS EVOLVE DUE TO NATURAL SELECTION AND GENETIC DRIFT**
- C. RECOGNIZES THAT “THE FORMATION OF NEW AND DISTINCT SPECIES IN THE COURSE OF EVOLUTION” USUALLY IS DUE TO THE GRADUAL ACCUMULATION OF SMALL GENETIC CHANGES, FOR EXAMPLE, SMALL RANDOM GENE MUTATIONS**

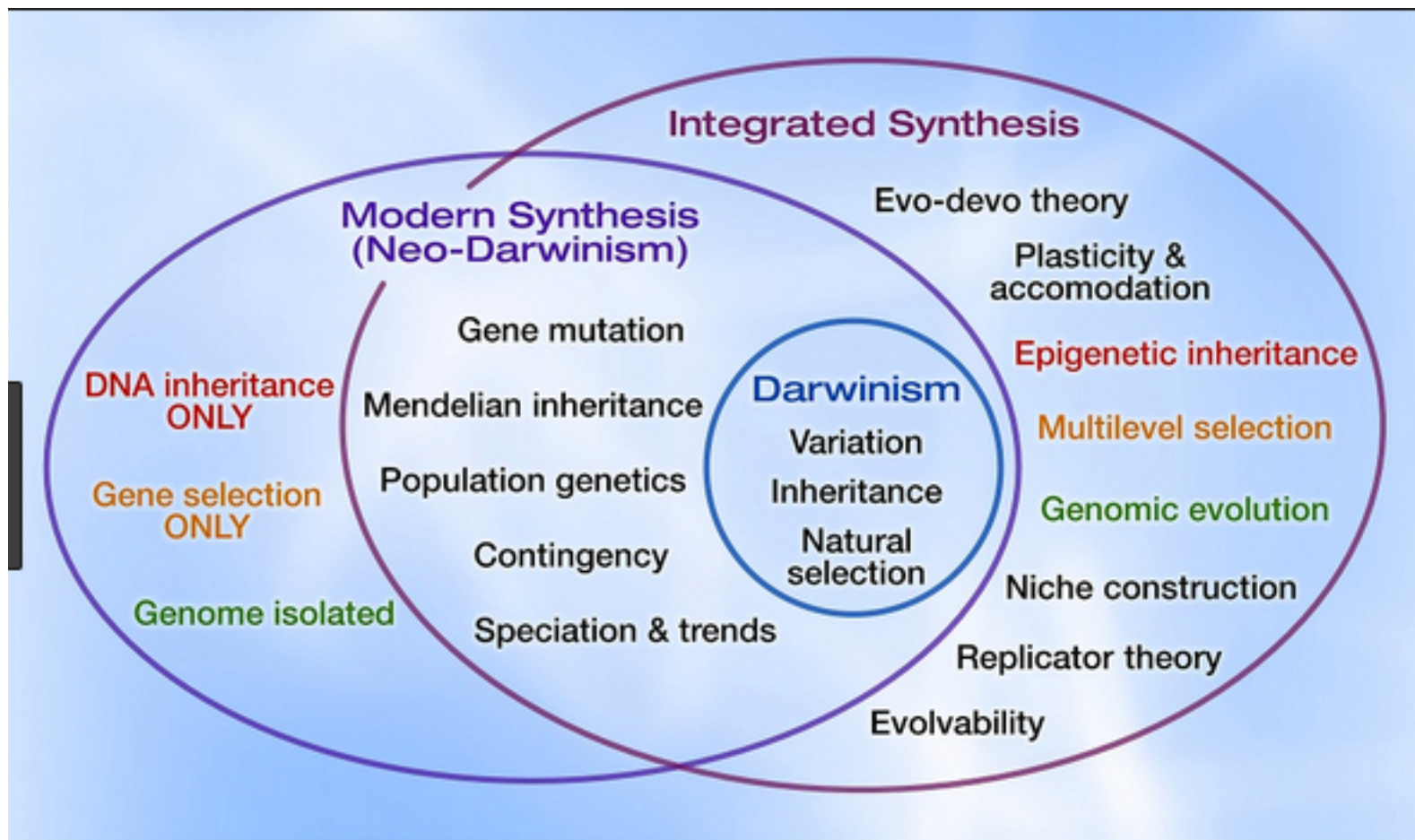
A gene mutation is a permanent alteration in the DNA sequence that makes up a gene, such that the sequence differs from what is found in most people. Mutations range in size; they can affect anywhere from a single DNA building block (base pair) to a large segment of a chromosome that includes multiple genes. One can have Hereditary mutations and/or acquired mutations. Acquired (or somatic) mutations occur at some time during a person’s life and are present only in certain cells, not in every cell in the body. These changes can be caused by environmental factors such as ultraviolet radiation from the sun, or can occur if an error is made as DNA copies itself during cell division. Acquired mutations in somatic cells (cells other than sperm and egg cells) cannot be passed to the next generation.

WHAT DOES NEO-DARWINIAN EVOLUTION MISS

HINTS:

- D. AFFECT OF CHILD ABUSE**
- E. EXPLAINING WHY IDENTICAL TWINS ARE SUSCEPTIBLE TO DIFFERENT DISEASES**
- F. EXPLAINING HOW IT THAT THERE ARE MORE BACTERIA CELLS IN HUMANS THAN CELLS OF OUR OWN GENOME**
- G. EXPLAINING HOW HUMAN TECHNOLOGICAL ADVANCES HAVE AFFECTED EVOLUTION**

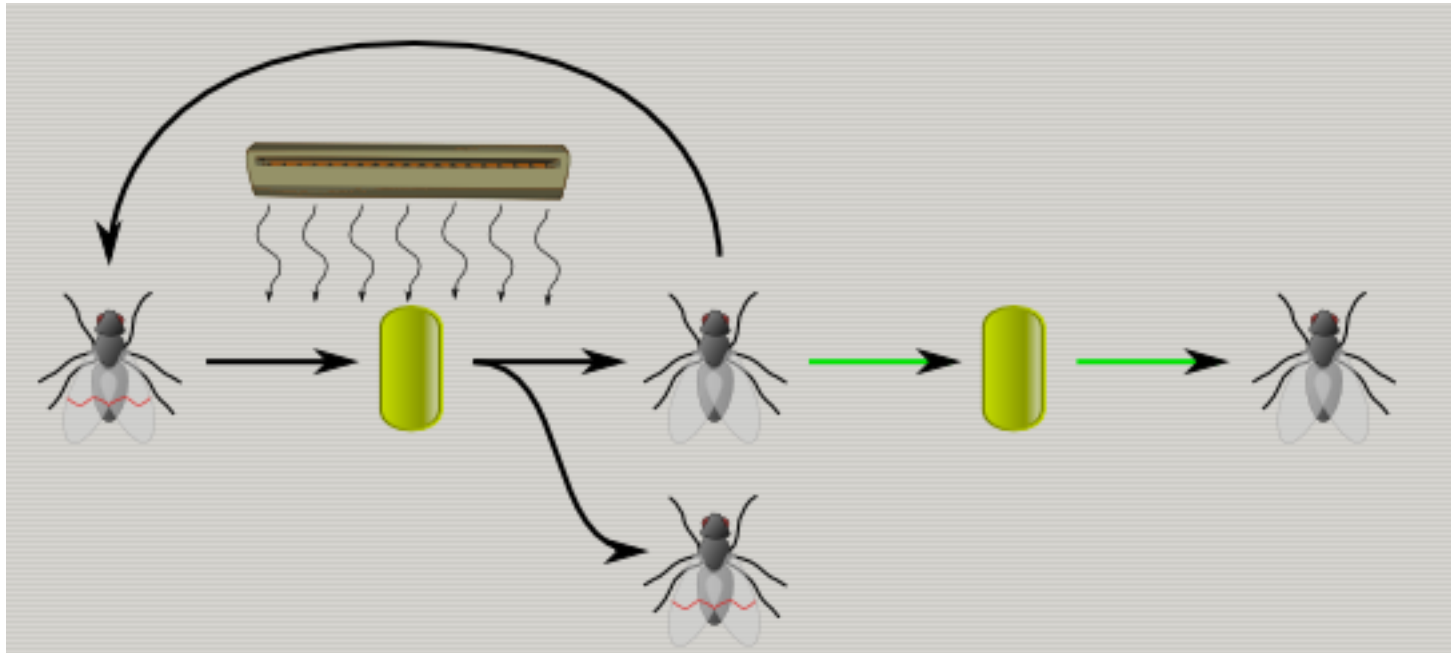
**MANY SCIENTISTS BELIEVE THAT EVOLUTION IS MORE COMPLEX THAN THE
NEO-DARWINIAN SYNTHESIS**



EPIGENETICS

a characteristic that is acquired as a result of an environmental change and is inherited.

A. Waddington's experiment with fruit flies



The crossing vein is symbolized by a red line on the wings of the left fly. If the pupae are exposed to heat a generation results in which some of the individuals show a crossveinless phenotype. If these individuals are selected and their pupae exposed to heat again after a few generations some individuals show the crossveinless phenotype even if their pupae have not been exposed to heat (green arrows)

B. RODENT GROOMING



Rodents, squirrels, like many other animals, groom their young by licking and stroking them. Michael Meaney's group in Canada have shown that this behavior enhances the health and longevity of the offspring. It also influences epigenetic markings in part of the brain called the hippocampus which, amongst other roles, plays a part in emotional behavior. The epigenetic effects can therefore predispose the offspring to show the same behavior towards their young.

C. TRANSMISSION OF MEMORIES - MICE



Action Press/Rex Features

Mouse pups — and even the offspring's offspring — can inherit a fearful association of a certain smell with pain, even if they have not experienced the pain themselves, and without the need for genetic mutations.

Mice that are trained to fear a particular smell pass that fear to their offspring who are not trained

D. AFFECT OF CHILD ABUSE - LOVE ONE ANOTHER AS I HAVE LOVED YOU



Neurological changes in child abuse victims may be passed on to offspring, research shows.

D. CONTINUED - AFFECT OF CHILD ABUSE

The review of published research by behavioral scientists at Emory University in Atlanta was based on studies that show how early life stress (ELS), such as physical and emotional abuse and neglect, leads to [observable changes in the brain's](#) hypothalamic-pituitary-adrenal (HPA) axis. This system, which is responsible for controlling the "fight or flight" response in humans, can be physically altered by abuse. While these changes can happen when abuse occurs at any point in life, the Emory study shows that abuse during pre-teen and adolescent years are [most damaging](#), resulting in mood and anxiety disorders like Post Traumatic Stress Disorder (PTSD) and depression.

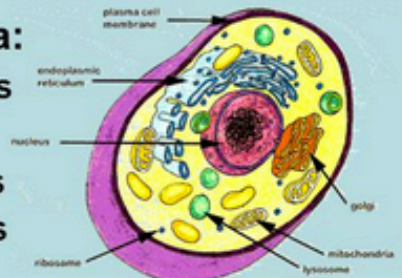
Cynthia Wolberger, an epigenetics specialist at Johns Hopkins Medical Institute, who is unaffiliated with the Emory Study, that since epigenetic changes can be brought on by stresses like abuse and those changes can be passed from mother to child, the symptoms of early abuse can be passed along years later from the original victim to her child -- even if the child has never been exposed to any traumatic stresses.

GENOMIC EVOLUTION - ENDOSYMBIOTIC EVOLUTIONARY THEORY

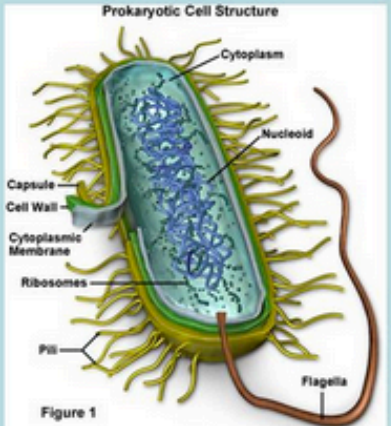
Symbiogenesis, or endosymbiotic theory is an evolutionary theory of the origin of eukaryotic cells from prokaryotic organisms, first articulated in 1905 and 1910 by the Russian botanist Konstantin Mereschkowsky and advanced and substantiated with microbiological evidence by Lynn Margulis. Common examples are mitochondria and chloroplasts

Eukaryotic and Prokaryotic Cells

<p><u>Organisms that are Eukaryotic:</u></p> <p>Every organisms that is not bacteria:</p> <ul style="list-style-type: none">- Animals- Plants- Fungus- Protists	<p><u>Organisms that are Prokaryotic:</u></p> <p>Every bacterial cell</p> <ul style="list-style-type: none">- Eubacteria- Archeobacteria
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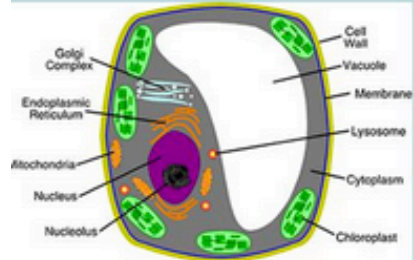


Labels: plasma cell membrane, endoplasmic reticulum, nucleus, golgi, mitochondria, lysosome, ribosome



Labels: Cytoplasm, Nucleoid, Capsule, Cell Wall, Cytoplasmic Membrane, Ribosomes, Pili, Flagella

Figure 1



Labels: Golgi Complex, Endoplasmic Reticulum, Mitochondria, Nucleus, Nucleolus, Cell Wall, Vacuole, Membrane, Lysosome, Cytoplasm, Chloroplast

Properties of Prokaryotic Cell

- No membrane-bound organelles
- No nuclei
- Unicellular organisms
- Contain ribosomes, cell membrane, cell wall, & cytoplasm
- Cell walls made of peptidoglycan

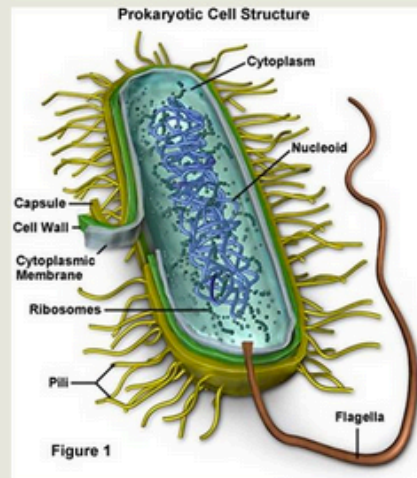
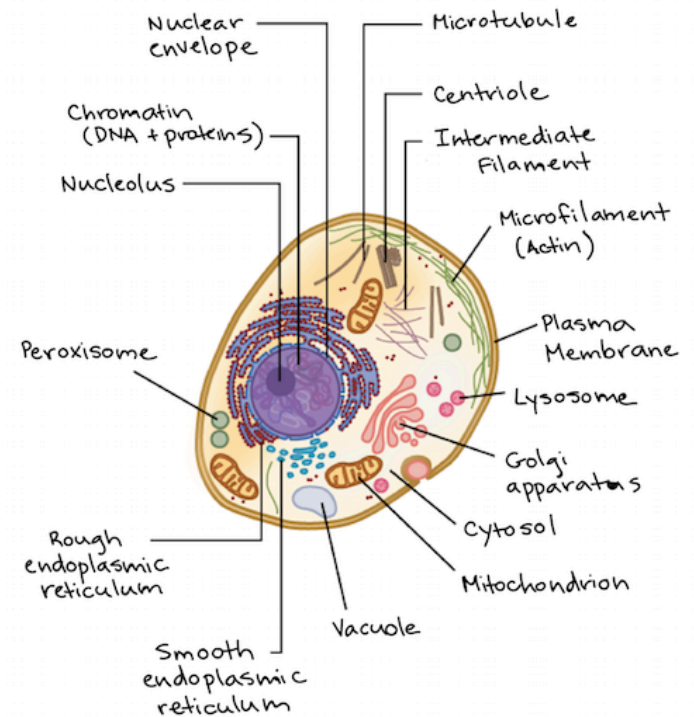


Diagram of a typical animal cell:



Eukaryotic cells - these are the kind of cells that form your and my body. *eukaryotic cells* have: A membrane-bound nucleus, a central cavity surrounded by membrane that houses the *cell's* genetic material. A number of membrane-bound organelles, compartments with specialized functions that float in the cytosol. Multiple linear chromosomes

Prokaryotic organisms - A microscopic single-celled organism that has neither a distinct nucleus with a membrane nor other specialized organelles. Prokaryotes include The bacteria and cyanobacteria. they lack mitochondria and chloroplasts. They have a single circular chromosome

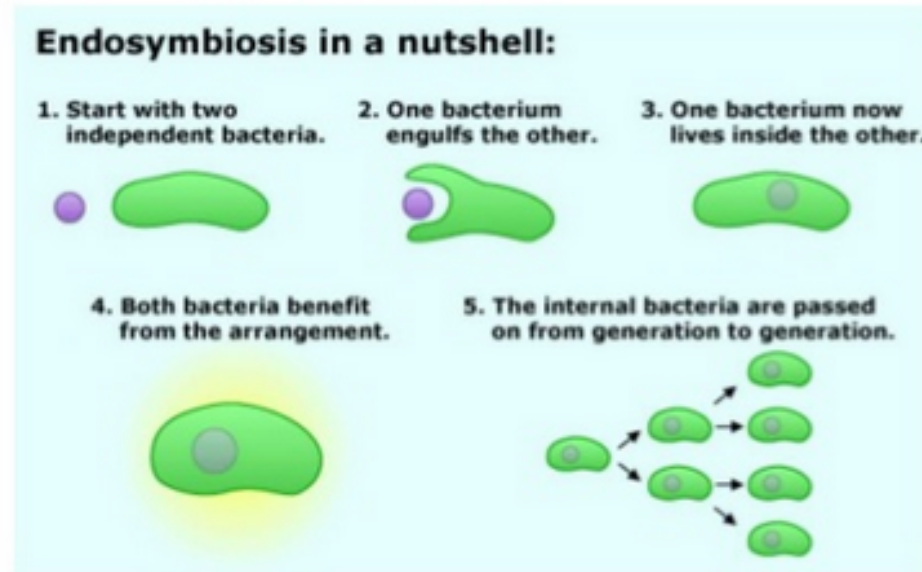
Scientific Evidence for Endosymbiosis theory

- Membranes of chloroplasts and mitochondria are similar to those of living prokaryotes
- Mitochondria and chloroplasts have their own ribosomes that more similar to prokaryotic ribosomes than ribosomes found in eukaryotes
- These organelles reproduces by binary fission within the cell
- Mitochondria and chloroplasts have their own DNA that match living prokaryotes' DNA. Chloroplast genes match genes of cycnobacteria (prokaryotes)

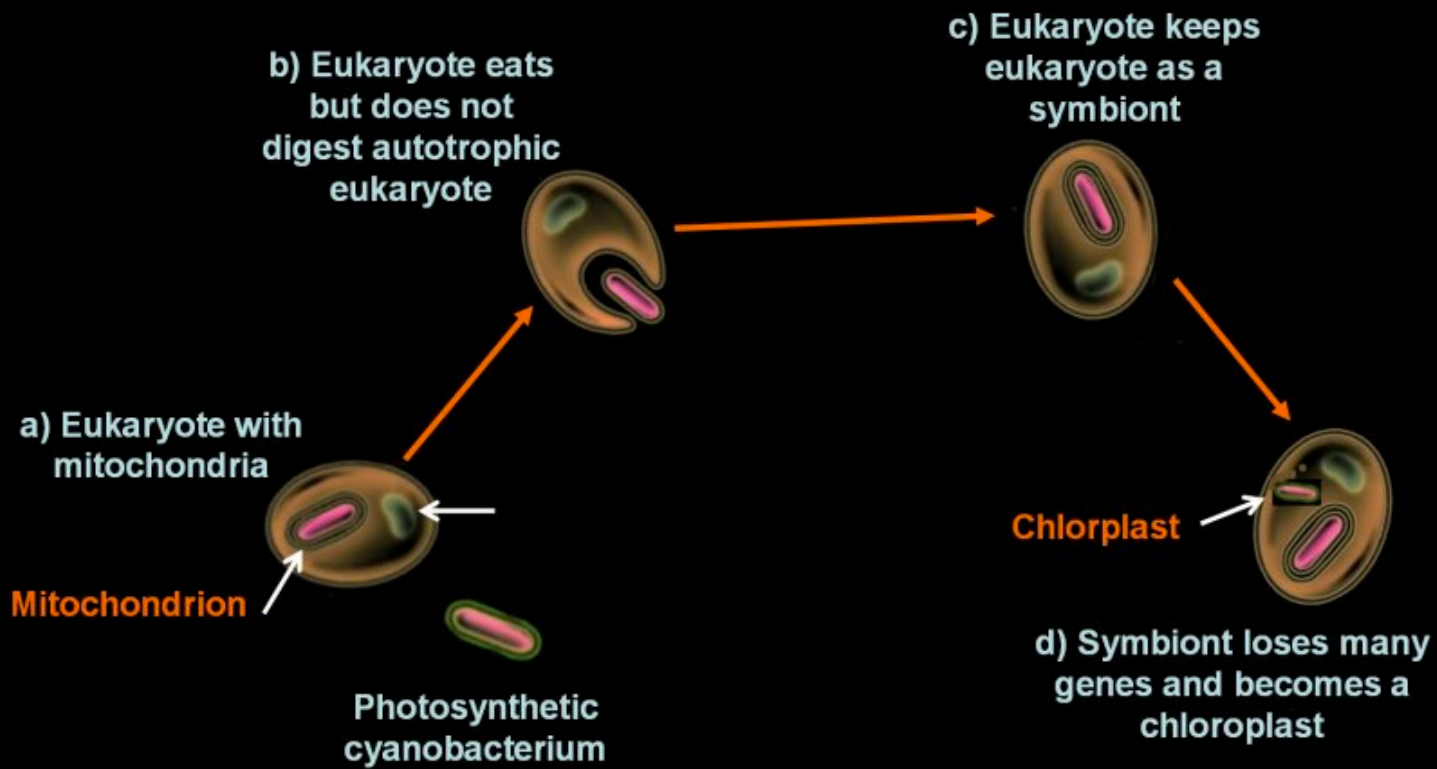
The Origin of Eukaryotic Cells

A.

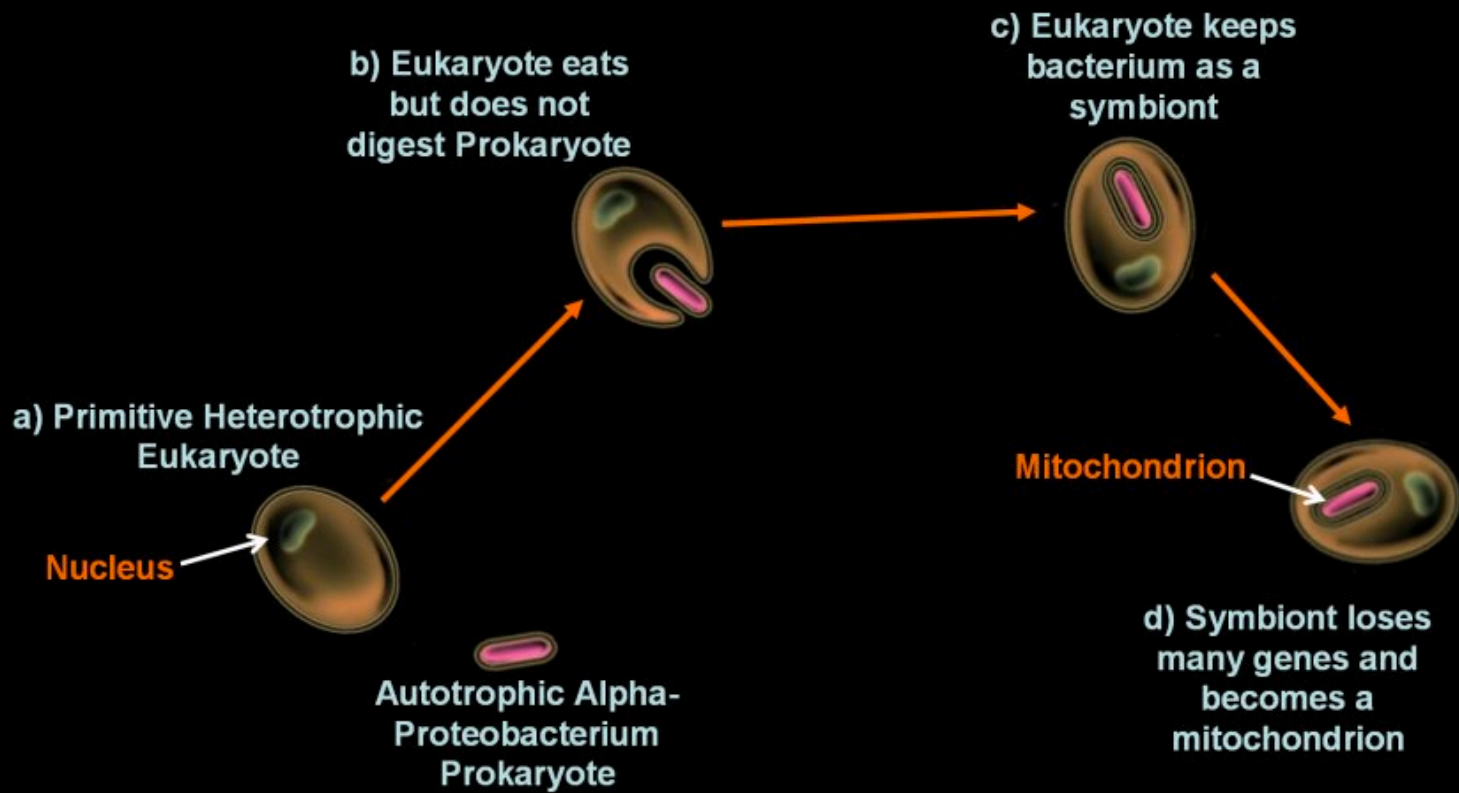
Serial Endosymbiotic Theory (SET): Chloroplasts and Mitochondria evolved from symbiotic bacteria that lived inside of a larger prokaryote



Mitochondria - an organelle found in large numbers in most cells, in which the biochemical processes of respiration and energy production occur. Mitochondria and chloroplasts are believed to have developed from symbiotic bacteria, (above) specifically alpha-proteobacteria and cyanobacteria. **Mitochondria** and chloroplasts likely evolved from engulfed prokaryotes that once lived as independent organisms. At some point, a eukaryotic cell engulfed an aerobic prokaryote, which then formed an endosymbiotic relationship with the host eukaryote, gradually developing into **mitochondrion**.



Endosymbiotic Origin of Chloroplast

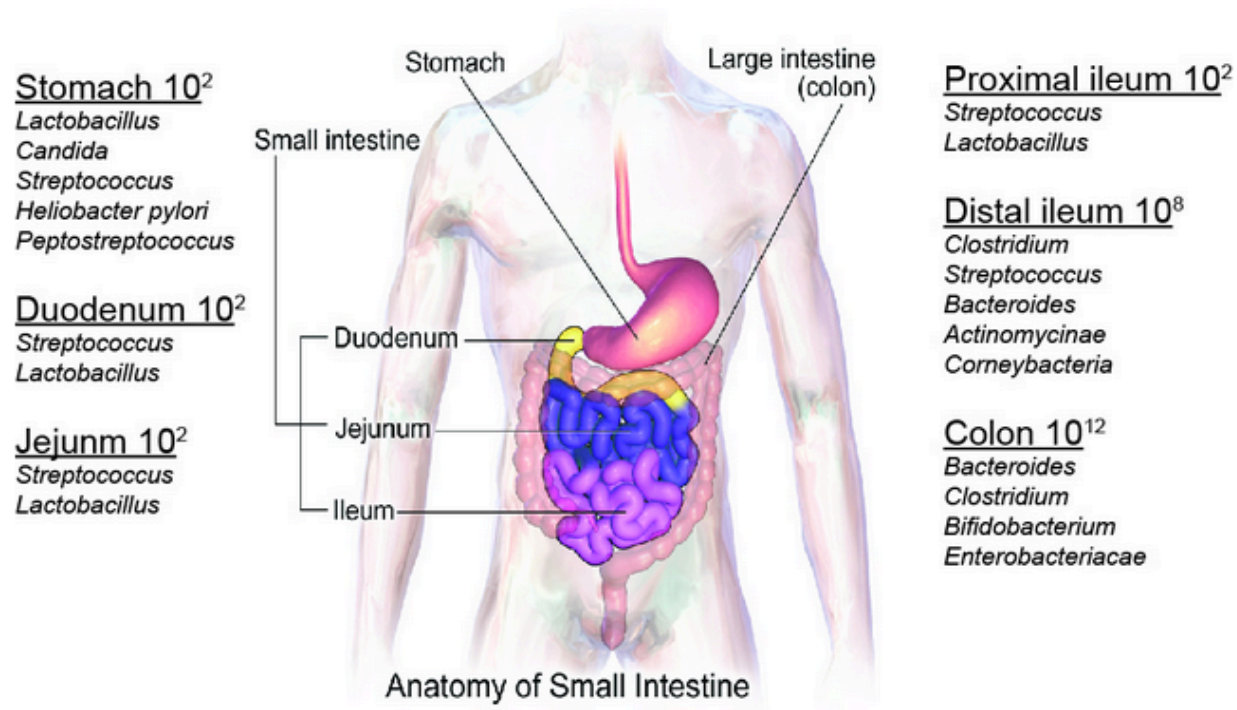


Endosymbiotic Origin of Mitochondrion

B. HUMAN BODIES

HUMAN BODIES ARE IN A SYMBIOTIC RELATIONSHIP WITH BACTERIA

FOR EXAMPLE, BACTERIA USE THE GUT TO SURVIVE AND THE BODY USES THE BACTERIA TO DIGEST FOOD.

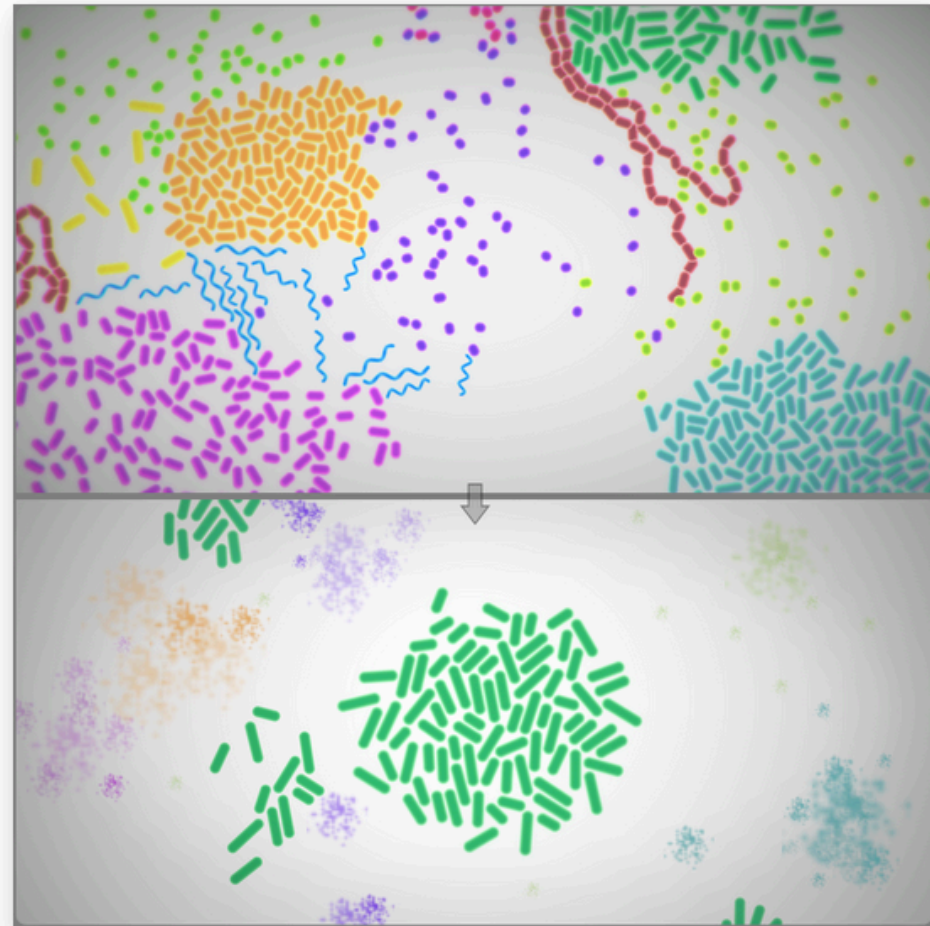


The World of Microbes (II): The Gut Microbiome in Health and Disease

Lots of microbes can gain access to an ecosystem. But only those with the proper adaptations—that is, those who can use the available resources and withstand environmental challenges—will survive and reproduce. Just like a fern from a wet forest will die if it's moved to a desert, microbes from your forearm will die in your stomach. Those that are best-equipped for the environment will take hold. In other words, the environment imposes selection.

Likewise, changing an ecosystem can affect who lives there. In the gut, for example, one important abiotic factor is food. Changing our diet influences the balance of microbes living in our guts.

Visit [Your Changing Microbiome](#) to learn more about how your microbiome changes over time.



Many microbes land on your skin, but only those with the right adaptations will survive and reproduce.

C. SEA SLUG



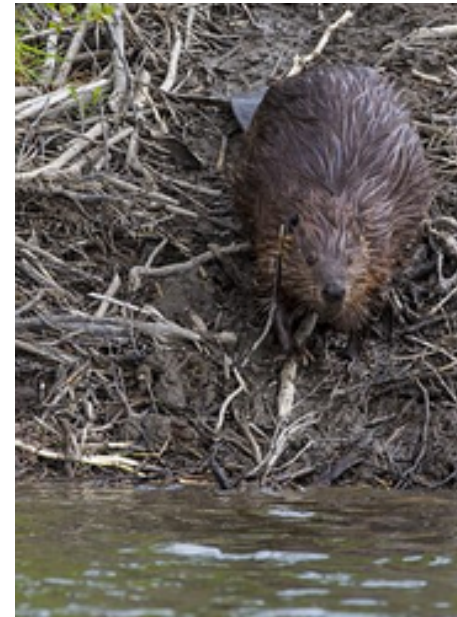
The rich green color of the photosynthesizing sea slug, *Elysia chlorotica*, helps to camouflage it on the ocean floor. Credit: Patrick Krug

Transfer of DNA between green algae and a sea slug has been shown to be responsible for a remarkable ability of the sea slug to photosynthesize. Algal DNA had not only been transferred to the host, but has been incorporated into the sea slug's genome

NICHE CONSTRUCTION

Niche construction is the process whereby organisms, through their activities and choices, modify their own and each other's **special environment**. By transforming natural selection pressures, **niche construction** generates feedback in evolution, on a scale hitherto underestimated, and in a manner that alters the evolutionary dynamic.

Beavers build dams and thereby create lakes that drastically shape and alter riparian ecosystems. These activities modify nutrient cycling and decomposition dynamics, influence the water and materials transported downstream, and ultimately influence plant and community composition and diversity.^[8]



[Chaparrals](#) and [pines](#) increase the frequency of forest fire through the dispersal of needles, cones, seeds and oils, essentially littering the forest floor. The benefit of this activity is facilitated by an adaptation for fire resistance which benefits them relative to their competitors.^[10]



[Cyanobacteria](#) provide an example on a planetary scale through the production of oxygen as a waste product of photosynthesis (see [Great Oxygenation Event](#)). This dramatically changed the composition of the Earth's atmosphere and oceans, with vast macroevolutionary and ecological consequences.^[12]

Human technological advances have changed ecological environments and eliminated certain species

Much like the Beaver but much more so, technological advances by humans have modified Earth's environment and eliminated some species

EVOLUTION AND FAITH

God is the Creator. He created a moving, functioning universe with planets, stars, galaxies, black holes, comets, etc. Is it any less surprising that he created life in a well structured way with bacteria, viruses, DNA and RNA, cells, insects, fish, mammals, humans, etc. Much like the structure of the universe organisms have a definite structure given by the DNA template and cell structure.

Our human bodies are a universe of human genome, bacteria genome, viruses, etc all contributing to the existence of human beings and, so, cooperation of genomes is necessary for our existence. Furthermore DNA shows how beautiful is the relationship between plants and animals in their basic template structure. Finally, the new studies called Epigenetic shows that there are consequences, as the Gospels suggests, to how we treat and interact with people. For example, Child abuse causes brain damage to the child.

