

ORIGINS

Genesis 1: 20-25

Session 6: Origin of Plants and Animals

James River Community Church

David Curfman

February – May 2013



What is Life?

- Dictionary.com – “The Condition that distinguishes organisms from inorganic objects and dead organisms, being manifested by growth through metabolism, reproduction, and the *power of adaptation to environment through changes originating internally*”.
- Benton Clark, University of Colorado astrobiologist – “a reproducing system that uses energy and follows a set of instructions embedded within the organism.” The instructions are the DNA and RNA “letters” that make up the genetic code in all organisms.
- <http://www.youtube.com/watch?v=CBeCxKzYiIA>
- “Psuchez” (Greek) (Psychology, 1653) – Heart, Mind, Soul and the breath of life; the essence of life
- “Zoe” (Greek) (Zoology, 1669) – Life as a principle, that which the Father has in Himself; animal life particularly
- “Bios” (Greek) (Biology, 1819)– The period of life or being alive; all life generally

Outline

1. **Genesis 1-11 (Introduction)**
2. **Genesis 1:1-31 (Universe Part 1) – Big Bang Model**
3. **Genesis 1:1-31 (Universe Part 2) – Old and Young Earth Models**
4. **Genesis 1: 1-19 (Earth) – Days 1 to 4**
5. **Genesis 1: 1-19 (Earth) – Formation and Age**
6. **Genesis 1:20-24 (Life) – Origin of Plants and Animals**
7. Genesis 1:13-25 (Life) – Fossils, Dinosaurs and Evolution
8. Genesis 1:26-2:4a (Man – male and female, Rest)
9. Genesis 2:4b-2:24 (Man and Woman, Garden of Eden & Marriage)
10. Genesis 3-6:9a (Sin & Curse & Decay)
11. Genesis 6:9b – 10:1a (The Flood & Justice)
12. Genesis 10:1b -12:4 (Nations and Languages)

Life: Objectives

- Understand the Scriptures concerning the creation of life
- Understand the significance of DNA and the genome in the origin of the life
- Understand the naturalist models on the generation of life
- Understand the true source of life

Quick Review

- God created the universe and earth. Christians are split 50-50 on the age of the earth and universe (3 primary models: young earth, progressive creation, & gap theory)
- The universe had a beginning
 - Big Bang requires 95% of matter & energy in the universe to be dark matter & dark energy
 - Big Bang is an explanation for the perceived “expansion” of the universe
 - Maximum reliable distance measurements are about 500 light years
- All dating methods have assumptions that are unverifiable due to long age. So, understand precision vs. accuracy
 - Radiometric dating requires constant decay rates without leaching from a known starting point.
 - Carbon-14 for organics seems reasonable. Igneous rock dating seems less supportable
 - Circular logic associated with dating fossils and strata
- Don't let changing science drive your understanding of the unchanging Word of God.
- Be consistent in your interpretation of the Word of God
- **Hebrews 11:3 – “By faith we understand that the universe was formed at God's command, so that what is seen was not made out of what was visible.”**

Life: What is it?

1. **Homeostasis:** Regulation of the internal environment to maintain a constant state; for example, electrolyte concentration or sweating to reduce temperature.
2. **Organization:** Being structurally composed of one or more cells (basic units of life). **All life is made up of RNA and DNA**
3. **Metabolism:** Transformation of energy by converting chemicals and energy into cellular components and decomposing organic matter. Living things require energy to maintain internal organization (homeostasis) and to produce the other phenomena associated with life. **All life uses oxygen to generate energy. Photosynthesis is the plant process to change carbon dioxide into oxygen for energy in light. Excess oxygen is emitted**
4. **Growth:** A growing organism increases in size in all of its parts, rather than simply accumulating matter.
5. **[Adaptation:** *The ability to change over time in response to the environment. This ability is fundamental to the process of evolution*] – added recently
6. **Response to stimuli:** A response can take many forms, from the contraction of a unicellular organism to external chemicals, to complex reactions involving all the senses of multicellular organisms. A response is often expressed by motion; for example, the leaves of a plant turning toward the sun.
7. **Reproduction:** The ability to produce new individual organisms, either asexually (most prokaryotes, i.e. bacteria), or sexually from two parent organisms (99.99% of eukaryotes, i.e. plants, animals, protista, fungi).

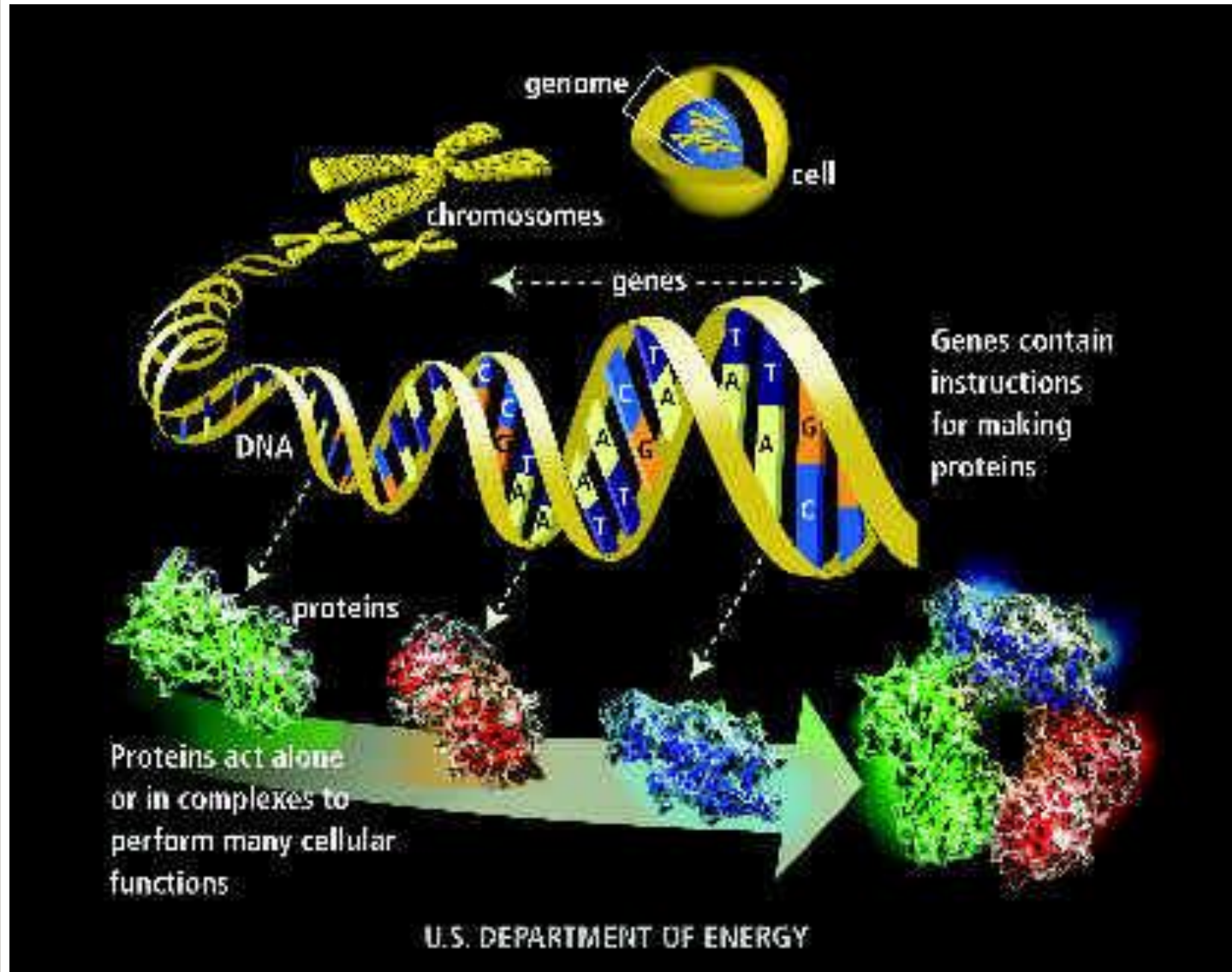
Life: Origin of Life

- Genesis 1:11-12 & 20-25 – And God said,
 1. DAY 3: Let the Land “produce” (germinate) **vegetation** (deshe)
 1. Land “brought forth” seed-bearing plants (grass, vegetation, seeds that are sown; could also be mosses and ferns; i.e. those with unseen seeds)
 2. Land “brought forth” trees that bear fruit with seed in it (e.g. fruit trees; could also include all plants with seeds)
 2. DAY 5a: Let the Water “teem” with **living** (lit. swarming, or slithering) creatures and “increase and fill the seas”
 1. Large Sea Life – God created (bara) “Great” creatures (tannin) of the sea (serpents, whales, sharks, large crocodiles, dragons, sea monsters) (Ex 7:9-12; Job 7:12; **Ps 74:13; Is 47:1**) but not the same as Leviathan (great sea monster – Job 3:8, **Ps 74:14, Is 27:1**)
 2. Small Sea Life – God created (bara) Every living and moving thing in the water (nephesh) (lit. air breathing/soulful creatures, e.g. dolphins or just “living”)

Life: Origin of Life

- Genesis 1:11-12 & 20-25 – And God said,
 3. DAY 5b:
 3. All Air Life – Let the birds (with feathers) fly above the earth across the vault of the sky. God “created” every winged bird (op – all flying things, insects, bats, birds) and “increase”
 4. DAY 6: Let the Land “produce” (germinate) living creatures
 1. Large Land Life – God “made” (asah) the livestock (behemoth – large 4-footed domesticated mammals, cattle; not the same word as **Job 40:15**)
 2. Small Land Life – God “made” the creatures that move along the ground (creeping moving things small creatures–small rodents and possibly small reptiles.)
 3. Other animals – God “made” the wild animals (wild mammals, beasts)
- ...All according to their “kinds” (leminov or leminihu – lit. species, life forms, or common DNA). NT uses “genos” (genes, family, parentage)

Life: Origin of Life - DNA



Life: Origin of Life - DNA

- DNA is the molecule that is the hereditary material in all living cells.
- DNA is found inside the cell nucleus. The tightly packaged form of the DNA in the nucleus is called a chromosome. Each cell in humans contains 46 chromosomes (23 pairs) and 2 meters of DNA
- Genes are made of DNA, and so is the genome itself. A gene consists of enough DNA to code for one protein, and a genome is simply the sum total of an organism's DNA
- The human genome is the term used to describe the total genetic information or complete set of DNA in human cells
- Most DNA is used for basic cellular functions which all living things share.
- Interestingly, humans have some of the least genetic variation of all animals, which is why inbreeding can cause genetic problems. Even two completely unrelated humans are usually genetically more similar than two sibling chimpanzees.

Life: Origin of Life - DNA








- Human Genome Project (HGP, \$3 Billion and 15 years, mapping the 3 Billion DNA base pairs) – On June 26, 2000, President Clinton ON THE COMPLETION OF THE FIRST SURVEY OF THE ENTIRE HUMAN GENOME PROJECT proclaimed:

“...Today's announcement represents more than just an epic-making triumph of science and reason. After all, when Galileo discovered he could use the tools of mathematics and mechanics to understand the motion of celestial bodies, he felt, in the words of one eminent researcher, "that he had learned the language in which God created the universe.” Today, we are learning the language in which God created life. We are gaining ever more awe for the complexity, the beauty, the wonder of God's most divine and sacred gift.”

- ENCODE Project (\$1+ Billion and 10 years+, the functions of base pairs) – The HGP concluded that our bodies are built and controlled by far fewer genes than expected. The vast stretches of DNA between our 20,000 or so protein-coding genes – more than 98% of the genetic sequence inside each of our cells – was written off as "junk" DNA. **But in 2012, the long stretches of DNA previously termed "junk" by HGP determined that they are in fact crucial to the way our genome works.**

Life: Origin of Life - DNA

Genome size comparison

	Species	Chromosomes	Genes	Base pairs
	Human (<i>Homo sapiens</i>)	46 (23 pairs)	28-35,000	3.1 billion
	Mouse (<i>Mus musculus</i>)	40	22.5-30,000	2.7 billion
	Puffer fish (<i>Fugu rubripes</i>)	44	31,000	365 million
	Malaria mosquito (<i>Anopheles gambiae</i>)	6	14,000	289 million
	Fruit fly (<i>Drosophila melanogaster</i>)	8	14,000	137 million
	Roundworm (<i>C. elegans</i>)	12	19,000	97 million
	Bacterium* (<i>E. coli</i>)	1	5,000	4.1 million


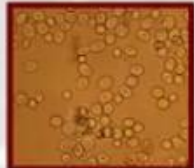



*Bacterial chromosomes are chromonemes, not true chromosomes

Life: Origin of Life - DNA



We have about half the same DNA as a banana, and yet people do not use this to emphasize how similar bananas are to us!

SHARED DNA WITH HUMANS

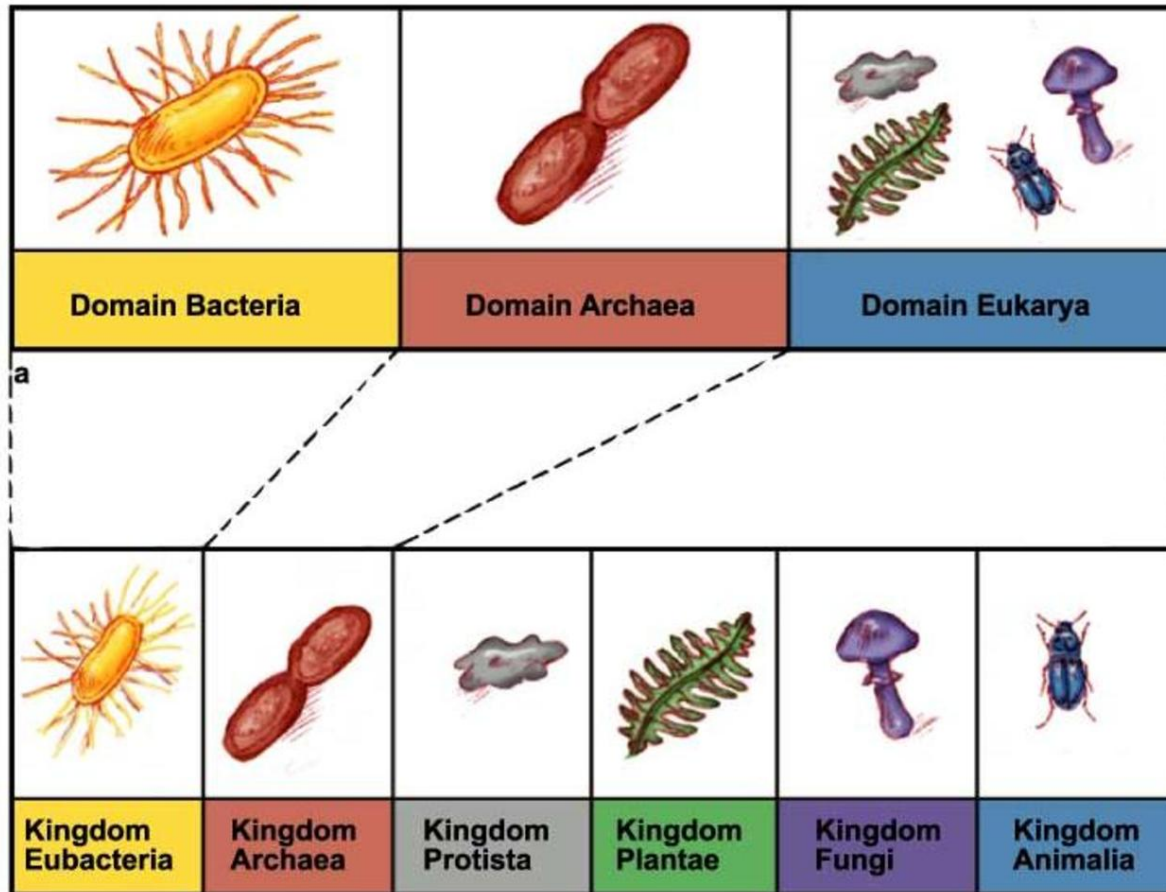
	CHIMPANZEE 98%		YEAST 26%
	MOUSE 92%		A WEED 18%
	FRUIT FLY 44%		

*Marian Koshland NAS Science Museum
National Human Genome Research Institute

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Life: Origin of Life

Classification of Living Things



Life: Origin of Life

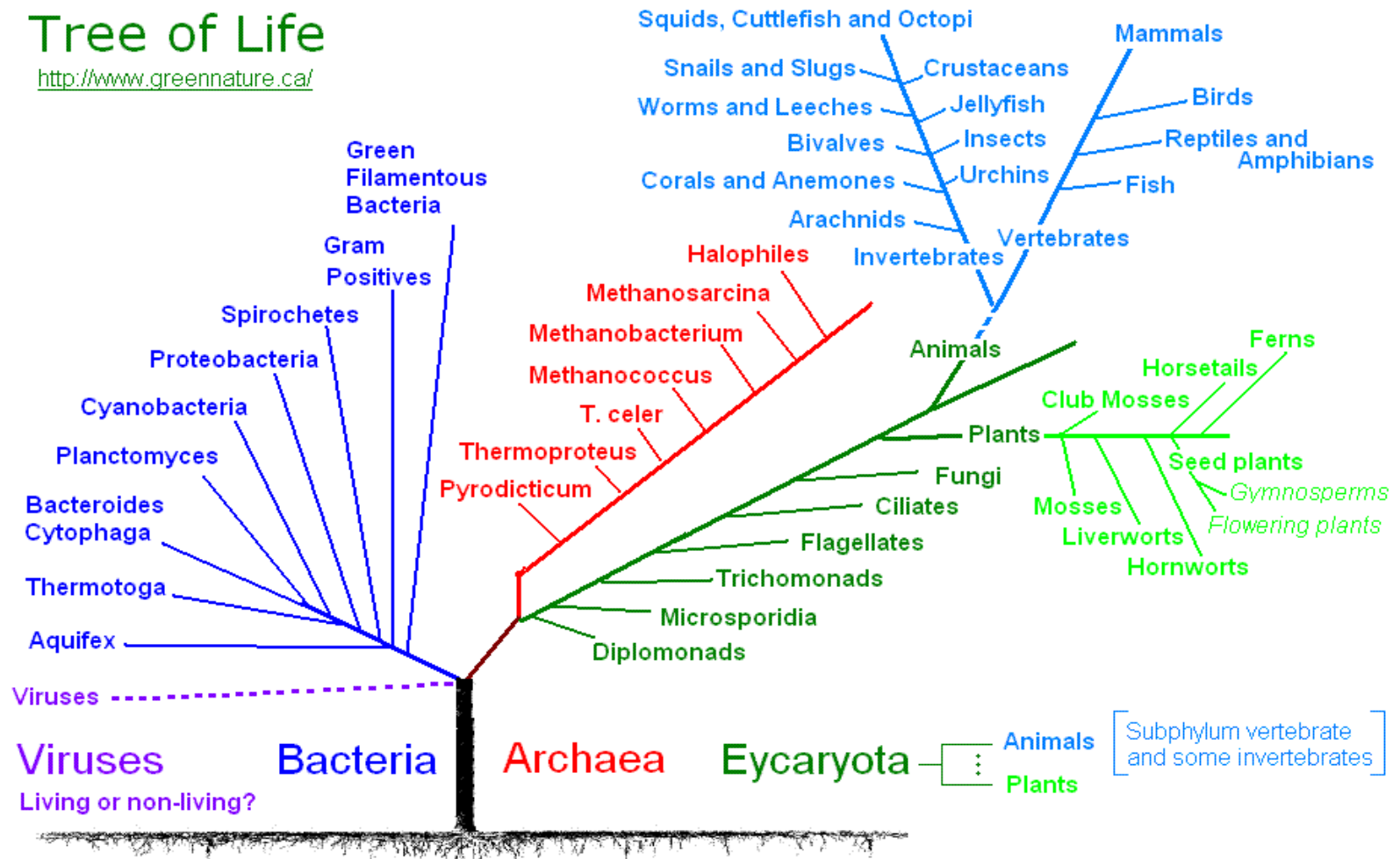
Classification of Living Things						
DOMAIN	Bacteria	Archaea	Eukarya			
KINGDOM	Eubacteria	Archaeobacteria	Protista	Fungi	Plantae	Animalia
CELL TYPE	Prokaryote	Prokaryote	Eukaryote	Eukaryote	Eukaryote	Eukaryote
CELL STRUCTURES	Cell walls with peptidoglycan	Cell walls without peptidoglycan	Cell walls of cellulose in some; some have chloroplasts	Cell walls of chitin	Cell walls of cellulose; chloroplasts	No cell walls or chloroplasts
NUMBER OF CELLS	Unicellular	Unicellular	Most unicellular; some colonial; some multicellular	Most multicellular; some unicellular	Multicellular	Multicellular
MODE OF NUTRITION	Autotroph or heterotroph	Autotroph or heterotroph	Autotroph or heterotroph	Heterotroph	Autotroph	Heterotroph
EXAMPLES	<i>Streptococcus</i> , <i>Escherichia coli</i>	Methanogens, halophiles	<i>Amoeba</i> , <i>Paramecium</i> , slime molds, giant kelp	Mushrooms, yeasts	Mosses, ferns, flowering plants	Sponges, worms, insects, fishes, mammals

- *Eukaryote* – Possess a distinct nucleus within which the genetic material is contained.
- *Archaea* (“ancient things”) – Possess no cell nucleus or any other membrane within their cells.
- *Prokaryote* – Organisms without a cell nucleus or any other membrane-bound organelles. Most are unicellular.

Life: Origin of Life

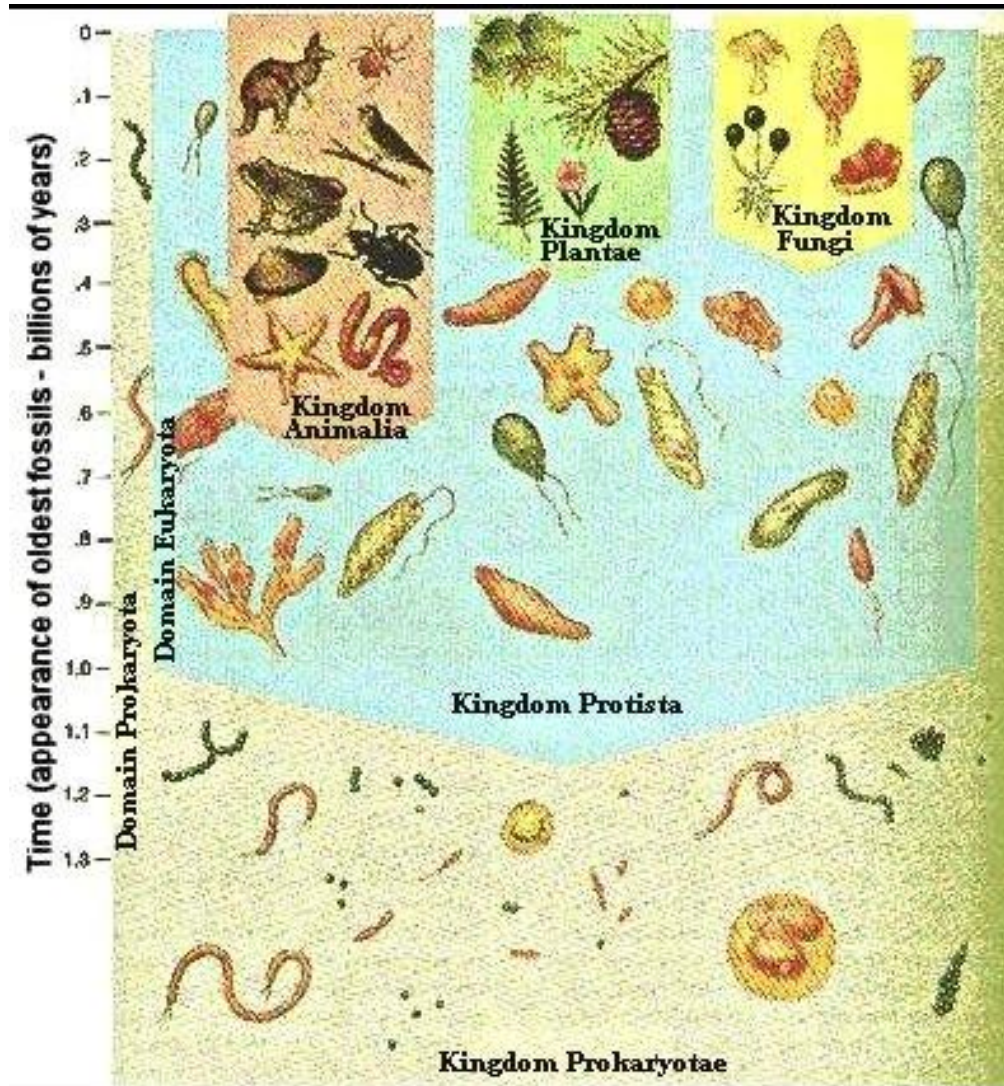
Tree of Life

<http://www.greennature.ca/>



Viruses – Possess genetic material, reproduce (only within a living being), and change through natural selection. However, they lack key characteristics (such as cell structure) that are generally considered necessary to count as life... "organisms at the edge of life".

Life: Origin of Life



Life: Extremophiles (examples)

- **Acidophile** – Lives best at pH levels of 3 or below (vinegar, stomach acid, lemon juice)
- **Alkaliphile** – Lives best at pH levels of 9 or above (Baking soda, TUMS, ammonia)
- **Anaerobe** - Does not require oxygen for growth such as *Spinoloricus Cinzia* (found in the Mediterranean in April, 2010 but not validated, named after wife of Italian scientist)
- **Halophile** – Lives best with at least 0.2M concentrations of salt
- **Hyperthermophile** – Thrives at temperatures between 80–122 °C (176-250 F), such as those found in hydrothermal systems
- **Metallotolerant** - Capable of tolerating high levels of dissolved heavy metals in solution, such as copper, cadmium, arsenic, and zinc.
- **Piezophile** – Lives optimally at high hydrostatic pressure; common in the deep terrestrial subsurface, as well as in oceanic trenches
- **Psychrophile/Cryophile** – An organism capable of survival, growth or reproduction at temperatures of -15 °C (5 F) or lower for extended periods; common in cold soils, permafrost, polar ice, cold ocean water, and in or under alpine snowpack
- **Radioresistant** – Organisms resistant to high levels of ionizing radiation, most commonly ultraviolet radiation, but also including organisms capable of resisting nuclear radiation

Life: Origin of Life - Abiogenesis

- Abiogenesis – “The natural process by which life arises from inorganic matter”
- Alexander Oparin(1924) – Proposed that the "spontaneous generation of life" did in fact occur once, but was now impossible because the conditions found on the early Earth had changed, and preexisting organisms would immediately consume any spontaneously generated organism.
- **There is no "standard model" of the origin of life**
- **No one has yet synthesized a "proto-cell" using basic components (e.g. DNA and RNA) which would have the necessary properties of life**
- **It is not understood how hundreds of amino acids became spontaneously linked to form the primary structure of a protein**
- **There is no explanation for the origin of sexual reproduction.**

Life: Origin of Life - Abiogenesis

- The oldest known fossilized stromatolites or bacterial aggregates, are dated by K/Ar of nearby igneous rocks at 3.5 billion years old.
- Only two primary sources for organic molecules:
 - Terrestrial –
 - Primordial soup based on different atmosphere than today (methane, ammonia, hydrogen sulfide, no oxygen!)
 - Thermal vents under the sea
 - Extraterrestrial – Deposited from meteors and asteroids around 3.5 Billion years ago (primary model) – “Panspermia”

Life: Origin of Life (Charles Darwin)

- Charles Darwin
 - 1861 - 3rd edition of *The Origin of Species* – “It is no valid objection that science as yet throws no light on the far higher problem of the essence or origin of life”
 - Letter to close friend Joseph Dalton Hooker on March 29, 1863 – “It is mere rubbish thinking, at present, of origin of life; one might as well think of origin of matter”
 - Letter to Hooker on February 1st, 1871 – “It is often said that all the conditions for the first production of a living being are now present, which could ever have been present. But if (and oh what a big if) we could conceive in some warm little pond with all sort of ammonia and phosphoric salts,—light, heat, electricity present, that a protein compound was chemically formed, ready to undergo still more complex changes, at the present such matter would be instantly devoured, or absorbed, which would not have been the case before living creatures were formed”

Life: Origin of Life - Abiogenesis

- Miller – Urey experiment (1952):
 - Mixture of water, hydrogen, methane, and ammonia was cycled through an apparatus that delivered electrical sparks to the mixture.
 - After one week, it was found that about 10% to 15% of the carbon in the system was now in the form of a mixture of organic compounds, including amino acids (the building blocks of proteins).
 - A recent reanalysis of the saved vials (using current and more advanced analytical equipment and technology,) has uncovered 23 amino acids, far more than the five originally discovered.
 - But the results were later questioned because the gases he used did not exist in large amounts on early Earth (old earth or young earth). Old earth Scientists now believe the primeval atmosphere contained an inert mix of carbon dioxide and nitrogen.
- Miller experiment (1983):
 - Repeated the experiment using the new mixture
 - The brown broth failed to materialize. Instead, the mix created a colorless brew, containing few amino acids.
 - Produced nitrites that destroy amino acids

Life: Origin of Life - Abiogenesis

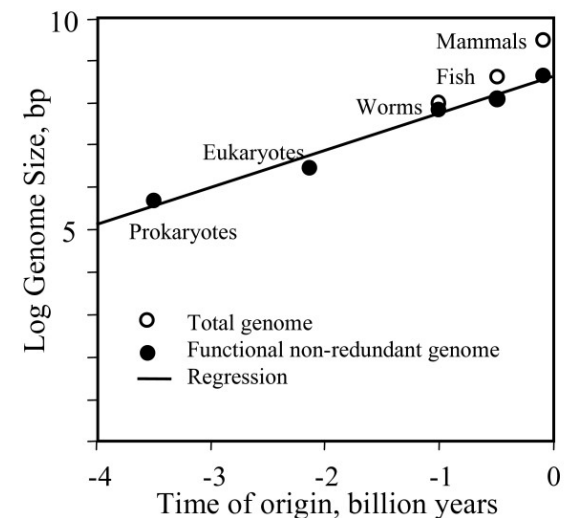
- Bada, former student of Miller, experiment (2007):
 - Repeated the experiment using the new mixture
 - Assumed that Earth contained iron and carbonate minerals that neutralized nitrites and acids.
 - He got the same watery liquid as Miller did in 1983, but this time it had amino acids. However, it had **no** nucleic acids (e.g. RNA and DNA)
 - “Even if our young planet had the right conditions to produce amino acids, ...**Amino acids are old hat and are a million miles from life,**” says Nick Lane (Dept of Genetics, London in Discover Magazine). “Indeed, as Miller’s experiments showed, it’s not difficult to create amino acids. The far bigger challenge is to create nucleic acids – the building blocks of molecules like RNA and DNA.” The origin of life lies in the origin of these “replicators”, molecules that can make copies of themselves. “Even if you can make amino acids (and nucleic acids) under soup conditions, it has little if any bearing on the origin of life”

Life: Origin of Life - Abiogenesis

- Robert Shapiro (1935 – 2011; Chem. Prof Emer. at NYU) wrote *Origins, a Skeptic's Guide to the Creation of Life on Earth* (1986), “Primordial soup” model:
 - This “primordial” atmosphere, exposed to energy in various forms, produced simple organic compounds
 - These compounds accumulated in a "soup", which may have been concentrated at various locations (shorelines, oceanic vents etc.).
 - By further transformation, more complex organic polymers and RNA and ultimately life – developed in the soup. This has been criticized as simplistic – a stage of "then magic happens".
- Nick Lane and Martin (2012) *Institute of Molecular Evolution at the Heinrich Heine University in Germany*, “Deep-sea vent” model:
 - Early ocean was acidic and filled with positively charged protons. Deep-sea vents spewed out bitter alkaline fluid, which is rich in negatively charged hydroxide ions
 - The vents created furrowed rocky, iron- and sulfur-rich walls full of tiny pores that separated the warm alkaline vent fluid from the cooler, acidic seawater. The interface between the two created a natural charge gradient (i.e. battery)
 - The interface powered the transformation of carbon dioxide and hydrogen into simple carbon-based molecules such as amino acids or proteins.
 - ‘Eventually’ that gradient drove the creation of cellular membranes, complicated proteins and ribonucleic acid (RNA), a molecule similar to DNA.

Life: Origin of Life - Abiogenesis

- **Rare Earth hypothesis** argues that the emergence of complex multicellular life on Earth (and, as follows, intelligence) required an improbable combination of astrophysical and geological events and circumstances. The hypothesis argues that complex extraterrestrial life requires an Earth-like planet with similar circumstance and that few if any such planets exist. (from *Rare Earth: Why Complex Life Is Uncommon in the Universe* (2000), a book by Peter Ward, a geologist and paleontologist, and Donald E. Brownlee, an astronomer and astrobiologist.
- **Panspermia** - In a National Institutes of Health study, the authors hypothesize that if biological complexity increased exponentially during evolution, life in the universe may have begun "10 billion years ago" - more than 5 billion years before the Earth existed. Thus life was "brought" to Earth via comets, meteors or asteroids.



Genesis 1:20-23 (Day 5)

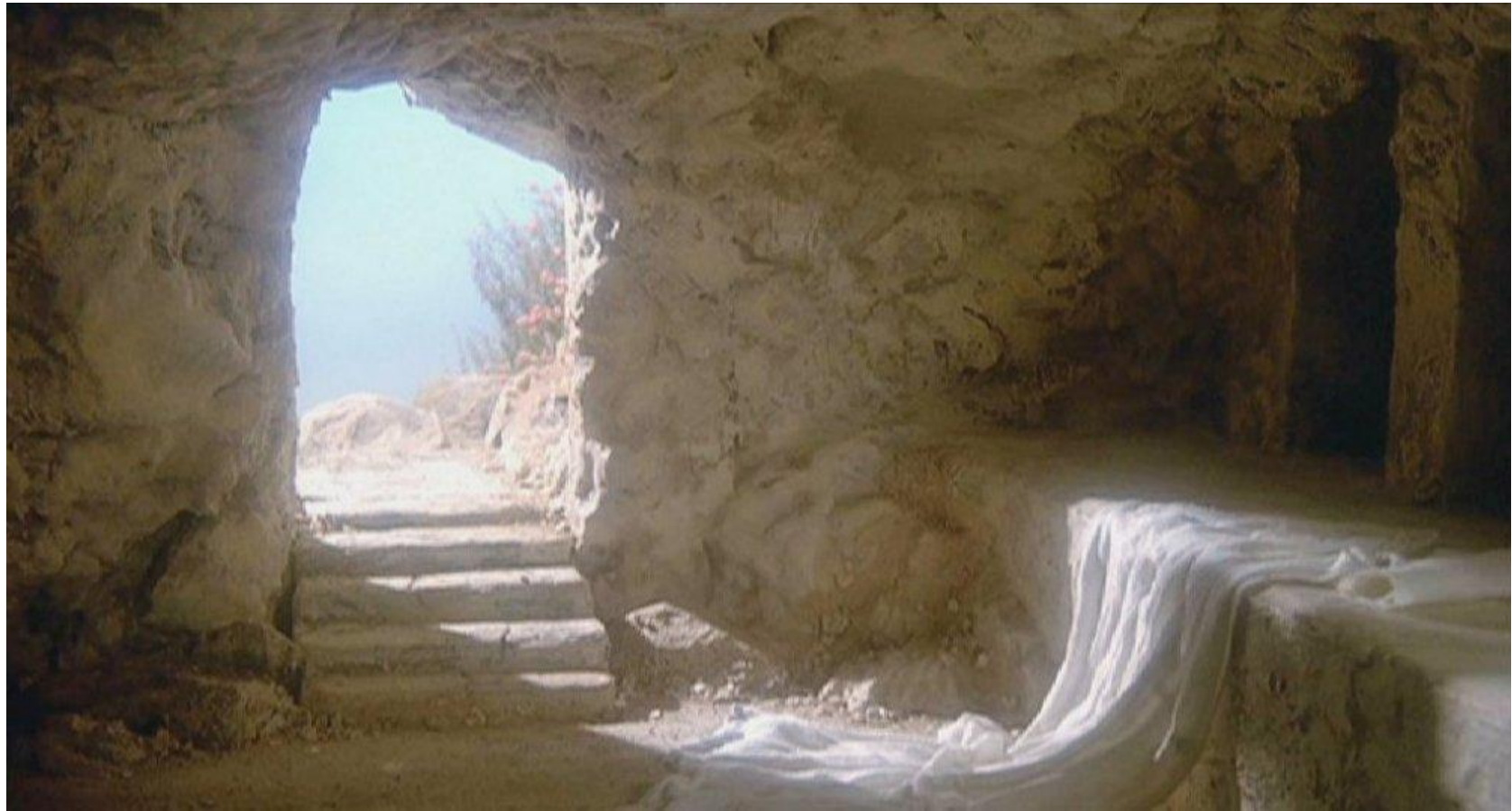
Text	Young Earth	Old Earth – Progressive Creation	Old Earth – Gap Theory
<p>"Let the water teem living creatures and let birds fly above the earth across the expanse of the sky."</p>	<p>Mature (fully developed) living forms. All living and extinct sea and air creatures</p>	<p>God created sea life and flying creatures on the fifth day, this creative process took place over long ages of time</p>	<p>Once conditions were right, God caused the life. Life emerged and some have become extinct</p>
<p>So God created the great creatures of the sea and every living and moving thing with which the water teems, according to their kinds and every winged bird according to its kind</p>	<p>God suddenly created all sea life and flying creates on the fifth day - all within 24 literal hours.</p>	<p>All life created over long period (in one day/era) . All major invertebrates appeared 570 million years ago</p>	<p>The text does not speak to "all" sea and flying creatures. "Nephesh Khayya", which means "living animated being" or air breathing creature, may be specifically that which has "soulish life" - mind, will and emotion, in contrast to simply organic life, referring only to the pinnacle of His sea faring creatures - the great whales, dolphins, and other great sea creatures now extinct.</p>

Genesis 1:24-31 (Day 6)

Text	Young Earth	Old Earth – Progressive Creation	Old Earth – Gap Theory
<p>"Let the land produce living creatures according to their kinds: livestock, creatures that move along the ground, and wild animals, each according to its kind." And it was so.</p>	<p>God created all of the myriad of land animals, along with the first humans - Adam and Eve - in a literal 24 hour period! All animals were herbivores until sin entered the world</p>	<p>God created all of the land animals, as well as humans, during a sixth "day age" - and that this creative process did not all occur within 24 literal hours, but over a span of ages (beginning hundreds of millions of years ago). Animals were carnivores, and herbivores. Death occurred before Adam sinned</p>	<p>God created all of the myriad of land animals, along with the first humans - Adam and Eve - in a literal 24 hour period! All other animals and fossils were created in Genesis 1</p>
<p>"God made the wild animals according to their kinds, the livestock according to their kinds, and all the creatures that move along the ground according to their kinds.</p>		<p>Old earth proponents also take the position that other biped hominids, such as the Neanderthals, were not human beings, having preceded the creation of Adam and Eve.</p>	<p>The human race began with the special creation of Adam and Eve, the first of the human species, about 50,000 years ago.</p>

Life – Origin:

- “Through Him all things were made; without Him nothing was made that has been made. In Him was life, and the life was the light of men.” John 1:3-4
- “For by Him all things were created: things in heaven and on earth, visible and invisible, ...all things were created by Him and for Him.” Col 1:16
- “God, who at sundry times and in divers manners spoke in time past unto the fathers by the prophets, Has in these last days spoken unto us by *his* Son, whom he has appointed heir of all things, by whom also he made the worlds” Heb. 1:1-2
- “Thou art worthy, O Lord, to receive glory and honor and power: for thou hast created all things, and for thy pleasure they are and were created”. Rev 4:11
- Jesus said, “I am the way, the truth and the life...” John 14:6
- Jesus said, “I am the resurrection and the life...” John 11:25
- Jesus said, “I have come that they may have life, and have it to the full” John 10:10
- Conclusion – Jesus is the source of ALL life



**HAPPY RESURRECTION
SUNDAY!**

Summary: Origin of Life

- There is no "standard model" of the origin of life
- No one has yet synthesized a "proto-cell" using basic components (e.g. DNA and RNA) which would have the necessary properties of life
- It is not understood how hundreds of amino acids became spontaneously linked to form the primary structure of a protein
- There is no explanation for the origin of sexual reproduction.
- All secular theories for the origin of life require an environment that, conveniently, does not exist today
- Creationist models:
 - Young Earth – God created all fully mature forms of life on days 3, 5 and 6 of the creation week. Death did not occur until Adam sinned. Fossils a result of the flood.
 - Progressive Creation – God caused each species to appear suddenly with unique DNA. Man is a specifically unique creation. Death and fossils (except human) occurred for millions of years
 - Gap Theory – Life created before Day 1. Vertebrates and other major life created during creation week. Death and fossils (except human) occurred for millions of years
- Jesus said, "I am the resurrection and the life..." John 11:25
- Next week – Evolution, Dinosaurs and Fossils