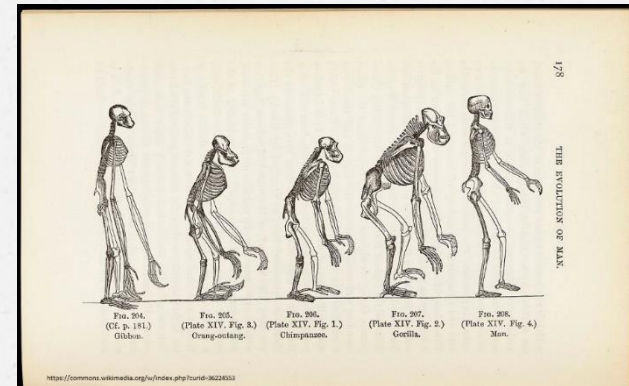
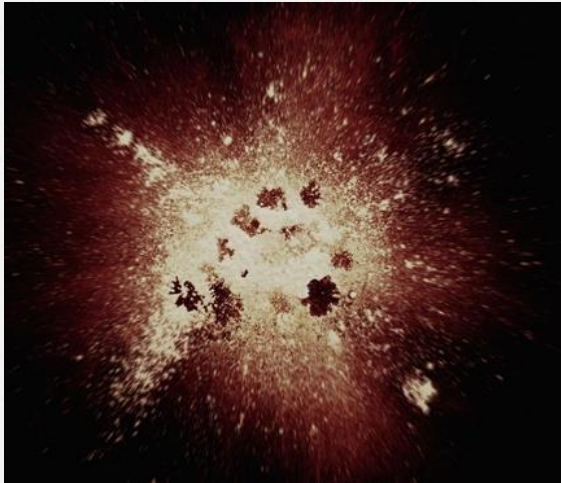


God, Evolution, and the Origin of the Life

A Journey from the Big Bang to the Creation of Man



Presented by David Keys, PhD

Defining Goals

- o Discuss
 - o Church's Teaching on Evolution
 - o What does the Church require?
 - o Science's Teaching on Evolution
 - o What does current evidence and scientific theory show?
- o What Does it take to have Human Life as we know it?
 - o A Neighborhood (the Universe) and a Home (the Earth)
 - o **Cosmic Evolution**
 - o An awakening of Life
 - o **Chemical Evolution**
 - o A Development of Life – all Forms
 - o **Biologic Evolution**
- o What are the odds of each and what does that really mean?
- o Are there Other Concepts?

The Absolute goal - TRUTH

- **Truth is Truth.** Science and Religion cannot disagree. Apparent differences needs to be properly understood within the Fullness of Reality.
- The FULLNESS OF TRUTH requires us to know the FULLNESS OF REALITY

An object can be both opaque and transparent. My skin is opaque in the ordinary realm of light, but to the Radiologist viewing in the realm of x-ray light, my body is nearly transparent.

By understanding **the reality involved**, an apparent contradiction can be resolved.



Whether you come to **know** TRUTH depends on how deeply you Trust the Source

But How do you know Truth?

- o All KNOWLEDGE is based on TRUST
 - o One Trusts one's Teacher, one's Books, one's measurements, one's logic, one's experiences, etc.
 - o Each of these could be wrong – SO TRUST WISELY
- o At some point your TRUST is so great that one can say I know it is TRUE
- o However, on the flip side, if you don't believe something is True in spite of the evidence, you may be considered willfully blind or even INSANE.

An example: Anyone know their birthday?



So how does the Catholic Church view Science?

o Truth

- o If Science shows Truth, so be it, remembering what Science considers to be true often changes.
- o True Science sets boundaries– true only under certain circumstances
- o In the ordinary, **Science** and **Religion** cannot conflict
- o In the **extra**-ordinary, the Transcendent God may suspend the ordinary and True Religion transcends Science
- o Thus, we can believe in
 - o God, Angels, A Soul, Miracles

o Determination of what is what, requires Faith AND Reason



Let's Examine Evolution and see if Science is in Conflict with Church teaching

Catholicism on Science and Evolution

o CCC 283

- o The question about the origins of the world and of man has been the object of many scientific studies which have splendidly enriched our knowledge of the age and dimensions of the cosmos, the development of life-forms and the appearance of man.
- o These discoveries invite us to even greater admiration for the greatness of the Creator, prompting us to give him thanks for all his works and for the understanding and wisdom he gives to scholars and researchers.
- o With Solomon they can say: *"It is he who gave me unerring knowledge of what exists, to know the structure of the world and the activity of the elements. . . for wisdom, the fashioner of all things, taught me."* Wis 7:17-22.

Catholic Warnings About the Literalist View of Scriptures in Regard to Science

o Augustine (354-430 AD)



- o Was familiar with Aristotle and chastised those who held a Literalist view of Genesis. He said in *On the Literal Meaning of Genesis* – “Now, it is a disgraceful and dangerous thing for a nonbeliever to hear a Christian, presumably giving the meaning of Holy Scripture, talking nonsense on these topics (earth, stars, animals, shrubs, so forth); and we should take all means to prevent such an embarrassing situation, in which people show a vast ignorance in a Christian and laugh it to scorn.”

o Aquinas (1225-1274 AD)



- o “Since sacred Scripture can be explained in many ways, one should adhere to no explanation so precipitously that he would [still] presume to assert this understanding of Scripture [even if] it were [later] agreed, because of a certain argument, that this position is wrong—lest Scripture be mocked by unbelievers because of this, and the way of believing be blocked for them.” (ST 1.68.1)

o Cardinal Baronius (1538-1607 concurrent with Galileo)

- o “The Bible is intended to teach us how to go to heaven, not how the heavens go.” (Galileo lived 1564 -1642)

So how does the Catholic Church Specifically view Evolution?

o Cosmic Evolution

- o God created the Heavens and the Earth as He wished out of love in an orderly process. Timeframe not specified. (“A day is like a 1000 years!” 2 Peter 3:8) **Probability: Single Event**

o Chemical Evolution

- o God began Life (“Breathed into his nostrils the Breath of Life” Gn 2:7—a poetic expression) **Probability: Multiple Tries**

o Biological Evolution **Probability: Multiple tries based on previous events**

- o God created Bacteria, Plants, Animals, etc. as He intended.
- o Human Life arose from a single Couple
 - o God created this Couple in His image and likeness, with a soul

o **Evolution with these tenets do not contradict Scripture**

- o Pope Pius XII’s *Humani Generis* August 12, 1950

God created all from Nothing - CCC 295
In an Orderly, Planned Process - CCC 299
For the sake of Man - CCC 358

Potential Issues in Cosmic Evolution: Science vs Catholicism

Issue	Science	Catholicism
The Cause of Creation	Not known	by God, not multiple gods
Pre-condition	Ex nihilo or multiverse	Ex nihilo whether one universe or many
How created	Low Entropy, with great order	Out of love in an orderly fashion
Process	Statistical, in accordance with the Laws of Physics	Planned, by command Actual process is a Matter for Science
Time Period	13.8 Billion years	Matter for Science
Result	Anthropic	Anthropic

Differing Physics Theories about the Origin of the Universe?

- o The Universe has always Existed
- o The Universe had a one-time Beginning
- o The Universe has had or will have multiple beginnings
- o Our Universe is but one of many, many Universes
 - o A Parent or previous Universes have always existed

These are contradictory!

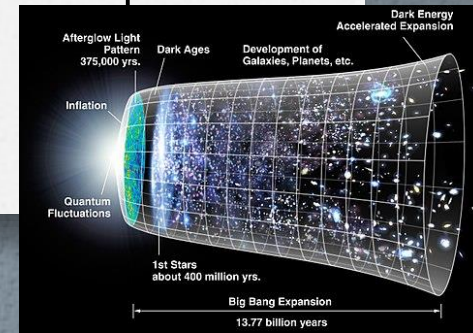
Predominate Scientific View about the Origin of the Universe

- o Einstein and others believed the universe was eternal (Steady State Theory). Thus Einstein initially rejected the idea of a Big Bang beginning of our universe as predicted by Fr. Georges LeMaitre in 1927
- o Hubble in 1929 demonstrated that the universe is expanding as if from a single point. Scientists can now state that the universe beginning occurred 13.78 billion years ago. (Why would you believe this?) The universe is considered to be young, with an expected lifespan of over 100 Billion years.
- o Physicists can calculate the activities of the universe down to the first 10^{-43} seconds
- o A multitude of experimental investigations have shown that the universe is expanding as if from a single point
- o The Universe will have an END!

Our Universe Had a Beginning-- a Hard Pill to Swallow for the Steady State Theorists!!!

The “Multiple Beginning” Scientific View

- o The Idea that **our Universe** has had multiple beginnings should also be officially **Dead**
 - o Multiple Beginnings means the that the Universe has always existed. A **Big Bang** occurred but the universe eventually will contract back to a point, only to have a new **Big Bang**. Sometimes called “**The Big Crunch**” or “**The Big Bounce**”
 - o But Our Universe has been determined to be forever expanding.
 - o The newly discovered existence of **Dark Energy** has been shown to be:
 - o Increasing the rate of expansion of the Universe!
 - o Causing the universe to eventually expand to “infinity” and never will contract.
 - o Eventually, all mass will disappear from sight and all temperature approach 0° Kelvin!!!



The Multiverse View

- o The Idea of a **Multiverse** – that our Universe is but one Universe popping out of a larger Parent Universe has its issues
 - o There is no way to investigate this concept. This is Metaphysics.
 - o There is no explanation of the origin of the Parent Universe
 - o But **either** the Parent Universe has always existed and therefore is no need for a Creator, **or** it was Created
 - o However, Theoretical calculations show that a parent Universe must also have a beginning and the offshoot of Child Universes must have organization, else the universes will collide with each other
 - o So, if true, the Multiverse has the same issues as a single universe has—there is a beginning and there is order
- o It is an attempt to rationalize the incredible unlikelihood that a **low entropy** universe would exist by creating an incredible number of universes. Maybe one would work!

Which Concept Reflects the known Initial Explosion of the Universe better?

A Random Explosion

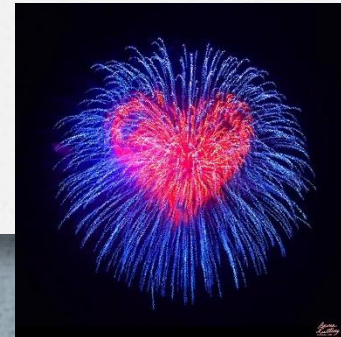
- o A Bang implies
 - o Energy Release
 - o Non-Directional
 - o Lacking Control
 - o **Disorder–High Entropy**



A Bomb
explosion

A Grand Launch

- o A Launch implies
 - o Planned Event
 - o Energy released in a controlled manner
 - o Controlled timely steps along the way.
 - o Expected Outcome
 - o **Order–Low Entropy**



A Fireworks
explosion

The Likelihood of our Low Entropy Orderly Universe

- o odds of our low entropy universe are **1 in $10^{10^{123}}$**
 - o Calculated by Roger Penrose, co-investigator with Stephen Hawking

1 in $10^{10^{123}}$ is

1 in 10^{1000000000000000000.....00000000}

The power is 1 followed by 123 Zero's

- 1 in 10^{101} is 1 in 10 Billion
- 1 in 10^{102} is 1 in 10^{100} , or 1 in over a trillion, trillion, trillion, trillion, trillion, trillion, trillion, trillion
- 10^{12} is a trillion (1,000,000,000,000)

- For comparison, there are only about 10^{79} neutrons and protons in the Universe



Does this look random to you?

Planned??

Here are Initial Events at $T = 0$

- o Laws of Physics for Our Universe Determined
 - o Forces to be Employed and their strengths
 - o Energy to be employed
 - o Dimensions Utilized (3, 4, ... 10, 20, ???)
 - o Various constants are put into place in the various laws
 - o Visible Matter, Dark Matter and Dark Energy created
- o Second Law of Thermodynamics established
 - o All interactions result in the loss of the ability to do work (increased Entropy); **order goes to disorder**
 - o The Universe was created with unlikely, extremely low Entropy

Four Forces Described

- o **Gravity** – Masses attract each other - Isaac Newton
 - o Your weight – same mass but different weights on earth, moon, space,
- o **Electromagnetism** – Related to Charge
 - o Moving charges create magnetic fields
 - o Positive charges attract, negative repel – Your hair at the Magic House
 - o Electrons are negative and protons positive
- o **Atomic Nuclear Forces**
 - o **Strong Nuclear Force** – Holds Atomic Nucleus Together
 - o Overcomes Repulsion of Charged Protons
 - o **Weak Nuclear Force** –
 - o Regulates the changing of particles from one to another –ex. neutrons into protons
 - o Regulates
 - o Radioactivity (release of particles)
 - o Fission (combination of particles)

<u>Ratio of the Strength of Forces</u>	
Strong	1
Electromagnetic	0.0073
Weak	10^{-9}
Gravity	10^{-38}

Constants associated with the Laws of Physics Determined at $T = 0$

- Related to Space and time (examples)
 - Smallest distance interval possible 1.62×10^{-33} cm
 - Smallest time interval possible 5.39×10^{-44} sec
 - Speed of light = 3.00×10^5 km/sec (186000 mi/sec)
 - Initial Entropy
 - Cosmological Constant (Rate of Expansion of the Universe)
- Related to Energy Constraints (examples)
 - Gravitational Constant
 - Strong Nuclear Force Coupling Constant
 - Weak Nuclear Force Coupling Constant
 - Electromagnetic force constant is a combination of other constants
- Individuating Constants (examples)
 - Rest Mass of Electron
 - Rest Mass of Proton
 - Unit of proton and electron Charge
- Various Large scale and Fine Structure constants dealing with large scale and small scale interactions

These Constants could have been given ANY Value at $T = 0$

What Would Happen If the Constants would have been Greater or Less

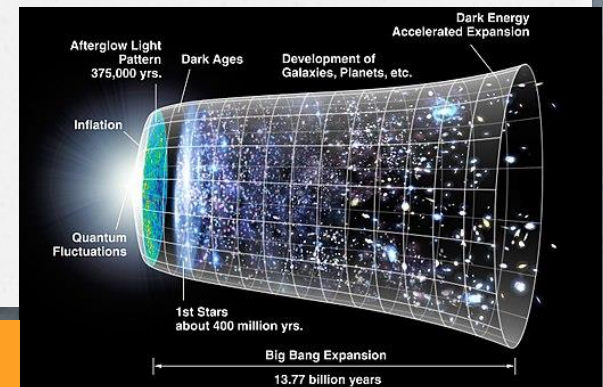
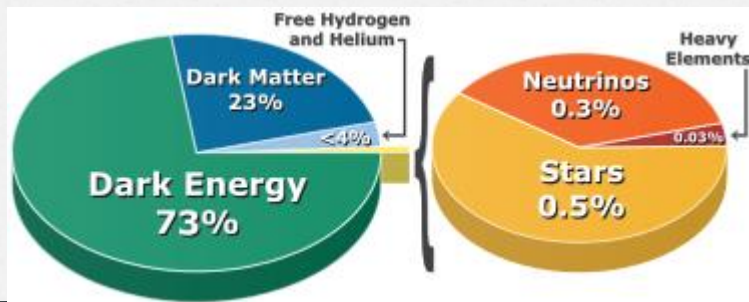
- o Gravitational Constant change of ± 1 part in 10^{50}
 - o If Greater, the Universe would have quickly collapsed back to a point
 - o If Lesser, the Universe would have expanded far too quickly and no galaxies would have ever formed
- o Weak Force Coupling Constant change of ± 1 part in 10^{60}
 - o Same as Gravitational effect– due to the effect on the additive cosmological constant (Dark Energy) whose value is less than 10^{-53}
- o Strong force constant change of $\pm 2\%$
 - o If Greater, no Hydrogen would exist, all elements would be Helium or higher. Hydrogen is essential whether as the source of fuel for stars, needed for Water, etc.
 - o If Lesser, no element with 2 or more protons would exist.

Does this look ordered to you?

Dark Matter and Dark Energy?

- **Dark Matter mass and Dark Energy mass** make up 96% of the Universe's mass
- **Dark Matter** is matter which does not easily absorb or reflect light. It has never been seen, but is proposed because some stellar bodies act as if they have more mass than they do. The fact it doesn't interact with light means that Dark Matter may not have any baryons (protons or neutrons), but no one knows for sure what it is! (Suggested by Lord Kelvin in 1904, popularized in 1980)
- **Dark Energy** is actually associated with a force or property of the Universe which is **weak when one is close and stronger the farther one is away** (opposite of other forces)! The effect explains why the Universe is expanding at an increasing rate now that the Universe is much bigger. Dark Energy repulsion or stretching of the Universe is overcoming gravitational attraction. No one really knows what it is as of yet. (1998)

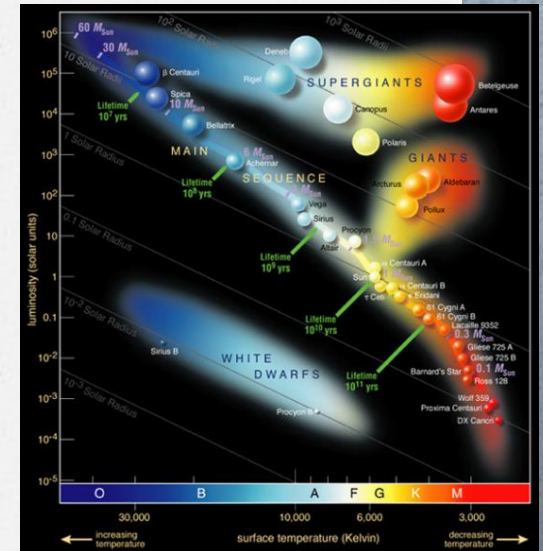
Is 44:24 "I am the LORD, the Maker of all things, who stretches out the heavens."



Remember $E = mc^2$, so mass can be referenced by Energy

Effects if the Mass would have been Greater or Less

- Relation of electron to proton mass
 - If ratio is less, all stars would be Red Dwarfs
 - If greater if greater, all stars would be Blue Giants
- Presence of Dark Matter
 - If not present, the Galaxies would never have formed as the outer stars would have been flung away
 - Total mass of the universe must be finely tuned to 1 part in 10^{60}



Physicists admit that the Universe is FINELY TUNED!!!

And after Creation of Matter is there Evolution of Matter for Life? For the Sake of Man?

o What is necessary for life? Now for Cosmic Evolution

- o Just having a Universe started is not nearly enough to ensure there can be life in the Universe.
- o In the 1980's only a few physical requirements for life to be started on earth or any planet was noted by Carl Sagan
 - o Now over 200 requirements have been found
 - o No planet other than Earth have been found to meet all the requirements.

o Once Life started (Chemical Evolution), how did we get where we are now (Biologic Evolution)?

- o Charles Darwin postulated:
 - o Started from one cell
 - o Gradually in small steps by RANDOM mutation and Natural Selection developed into different species
 - o Is this supported by Science?

For the Sake of Man?

Critical Pre-Events for Human Life

- o The Planet must be in a solar system that is part of a spiral galaxy
 - o There are 3 general types of Galaxies
 - o Irregular
 - o Elliptical
 - o Spiral
 - o Our solar system is in the Milky Way Galaxy which is a spiral Galaxy



Remember only a narrow range of physics constants can produce these patterns

Critical Pre-Events for the Life

◦ Why a Spiral Galaxy is important

- **Irregular** galaxies produce chaotic orbits which would disrupt planetary orbits
- Star formation ceases early in **Elliptical** Galaxies
 - Because of this stars in Elliptical Galaxies produce insufficient abundance of heavy elements needed for life. Check your vitamins to see the necessity for heavy elements.
- **Spiral** orbits have regions which bombard planets with just the right amount of UV and heavy elements which are necessary for life,
 - Plus there is a safe region between arms to minimize radiation
 - And a “**Co-rotation radius**” at which the solar system is neither pulled into the hot center nor thrown out of the galaxy.
- At about **T = 9 Billion years**, our Solar System was formed. It was originally close to the center, but suddenly it moved to a perfect space between the radial arms of the disc-like Milky Way Galaxy,
 - Being formed initially close to the center results in the Earth's high levels of phosphorus, fluorine, aluminum, titanium, uranium, and thorium
- Age of the Earth is about **4.5 Billion years old**



Critical Pre-Events for Life

- o **Habitable zones**-- There are at least 9 scientifically defined Habitable zones requirements for life. Here are 2.
- o The Earth is positioned in the **water habitable zone**. This zone allows water to exist in all three states – solid, liquid, and gas.
 - o If 1% closer to the Sun, runaway evaporation of water would occur (2013 paper)
 - o If 37% to 67% farther from the Sun runaway freezing of water would occur
- o The Earth is also positioned within the **UV habitable zone**
 - o Low levels of UV are required for human life for Vitamin D, DNA repair, etc.
 - o High levels are deadly
 - o Only 3% of the Planets of the 40+ billion planets in the MWG meet this criteria

Critical Pre-Events for Life

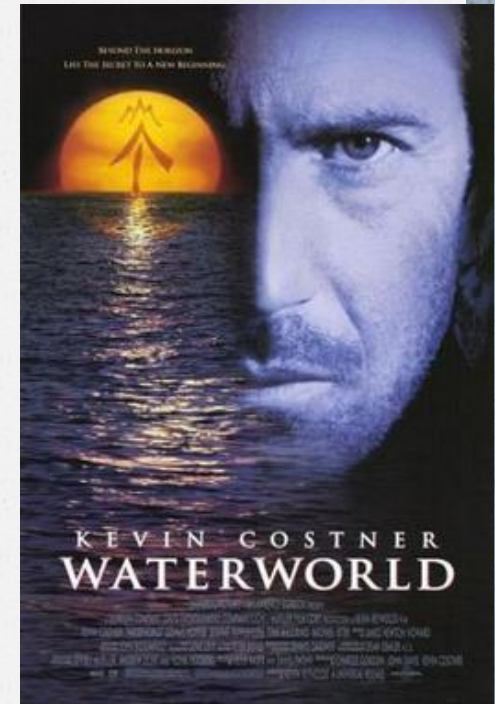
o **Other Habitable zones**— Here are 7 more.

- 3) **Photosynthetic zone**— Needs proper Light intensity, Ambient Temperature, seasonal stability
- 4) **Ozone zone**— Oxygen level, Right UV level, Stable UV radiation
- 5) **Rotation Rate zone**- Effects reflectivity of clouds, and of temperature, winds
- 6) **Obliquity zone** - Also affects temperature, greater obliquity pushes zone out farther, affects seasons
- 7) **Tidal zone** - too close to Sun, results in tidal locking (no rotation, like the moon. Earth's rotation was 3-4 hours per day), also affects obliquity
- 8) **Astrophere zone** - Stars produce a “wind” of particles which can deflect/absorb cosmic rays. Too close is deadly, too far ineffective

Other Earth Requirements for Life

o Water

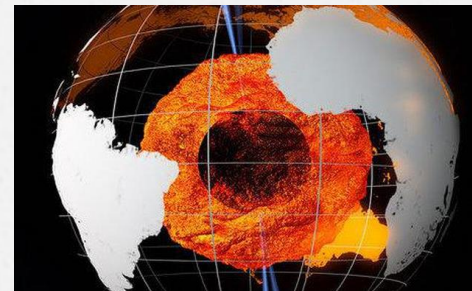
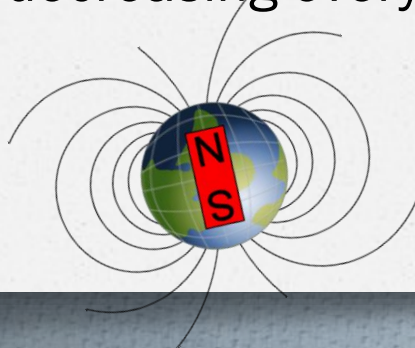
- o Trapped by the Earth's mantle, as the mantle cools, water is released into the atmosphere, then condensed to liquid
- o Water arrives due to comets and asteroids (perhaps the majority)
- o Don't forget the special property -- water gets less dense when it freezes
- o Earth was a Waterworld at one time
 - o We now have 500 times less water than other planets of the same size and surface temperature
 - o We have continents!
 - o Yet still has rivers, lakes, oceans to replenish life. Think of the importance of the Nile
 - o Water currently covers only 71% of the Earth's surface



Other Earth Requirements for Life

o Essential Magnetic Force

- o Keeps atmosphere from sputtering away,
 - o requires a liquid iron outer core surrounded by a solid iron inner,
 - o a specific viscosity, temperature dependency
 - o must last 4 Billion years duration,
 - o Only works if the mass of a planet is within 1.0-1.4 times that of the earth
- o Protects the earth from solar winds which would deplete water and atmosphere
- o Is decreasing every year



Other Earth Requirements for Life

◦ Habitable Longevity

- The solar system is not static. As changes happen, the planet must be able to adjust
 - The intensity of light from the sun has changed with time
 - The planet must be habitable for a sufficient time to develop life
 - Did Mars have water? What happened?

Figure 12.2. Sun's Luminosity History according to Guzik and Mussack

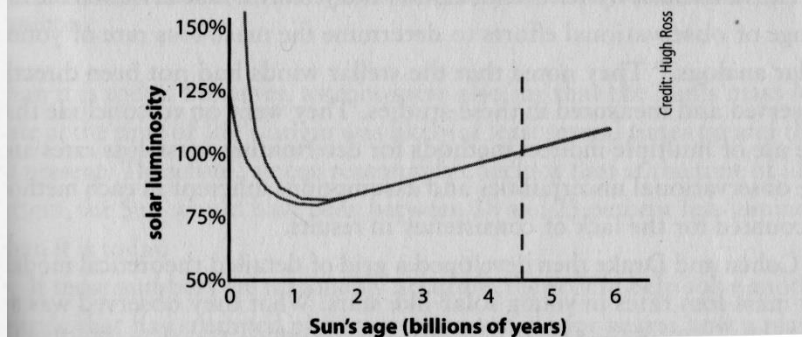
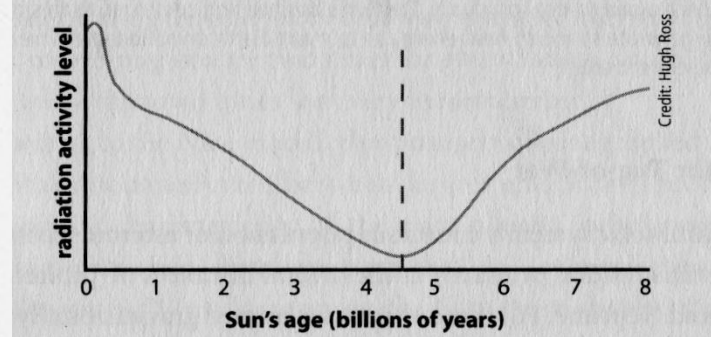


Figure 6.1. Solar Flare Activity throughout Solar History



Other Earth Requirements for Life

- **The orbit of the Earth must be nearly circular.**

Most planets have elliptical orbits. Imagine large variations of distance from the sun and how that would effect Earth temperatures. (Think of the effects of the earth tilt between summer and winter and how that small distance change results in “large” temperature swings.)

- **Jupiter, a large planet,** is positioned so that the gravity of Jupiter sweeps most asteroids and other heavenly bodies away from the earth.

- **The moon was blasted from earth** due to a collision with an asteroid the approximate size of Mars

- Most of the **Earth's water** was splashed or vaporized away by the impact

- Remember there is 500 times less water on earth than expected.

- **SO IMPORTANT!!**

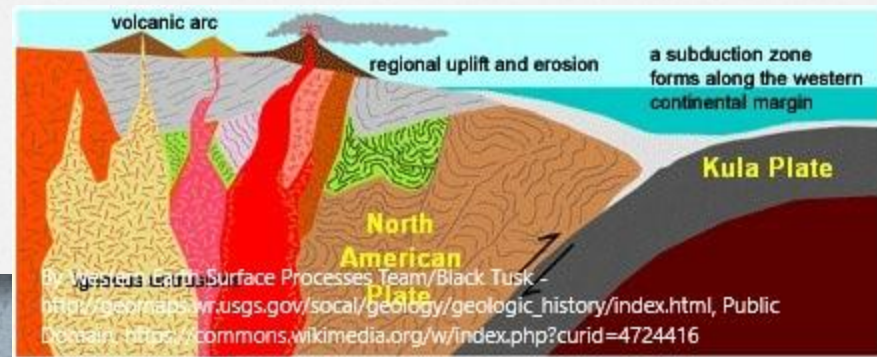
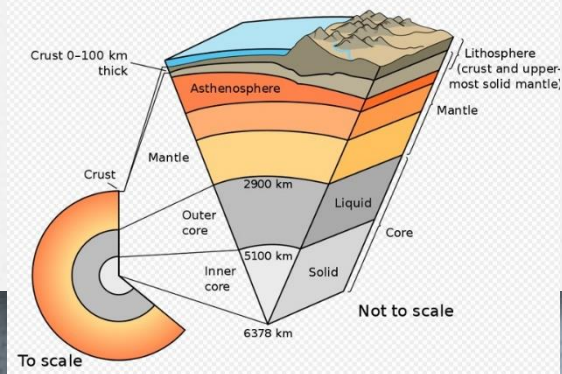
- The Moon's gravity (together with the sun's) has gradually helped to reduced the **Earth's rotation** from a 3 hr day to a 24 hr day (and will continue to slow down the rotation over time)

- The Moon also stabilizes **the oscillation of the tilt of the Earth** allowing the warming the Northern hemisphere, then warming the Southern.



Other Earth Requirements for Life

- o The **Earth's crust** is composed of plates (so-called Tectonic plates). As the result of collisions of the plates and volcanic activity the earth's crust is continuously recycled, giving new minerals, releasing gases.
- o Volcanic activity and releases of CO_2 have reversed ice ages in the earth's past.
- o Venus and Mars by comparison have solid crusts.
- o Presence of a molten center and plates is due in part to all the radiation received in earth's early years



Final External Preparation



- o There was a “**Late Heavy Bombardment**” of the Earth of by comets, asteroids, heavy elements and other “space” material which ended about **3.9 Billion years ago**.
 - o 200-1000 tons of heavy elements and material PER SQ YD were deposited across all the Earth
 - o Raised the temperature of the earth
 - o melting/vaporizing much of the surface ice/water
 - o More than 10% of earth surface rocks were melted down 1 km deep
 - o When the earth’s surface cooled, single cell LIFE flourished
- o You will NOTE A PATTERN
 - o Disaster Occurs, Major change in Life Occurs

Kinds of Life

- o Physical

- o Unicellular life

- o Bacteria

- o Viruses

- o Algae, etc.

- o Differential Multicellular life

- o Fungi

- o Plants

- o Animals (ingest food and are usually able to move about during at least part of their life cycle)

- o Physical and Mind Possessing

- o Animals capable of experiencing and expressing emotions

- o Mammals, Birds, some reptiles

- o Physical, Mind Possessing, and Spiritual

- o Body and Soul

- o Engage in Philosophy, theology, meaning of life, abstract thought, art, etc.

But How Did Life Begin? Chemical Evolution

o Simple Answer- No one knows! Somehow:

- o The right materials were present. ~ 1200 nucleotide organic molecules make up the simplest cell
- o The materials happened to combine correctly
 - o The likelihood of amino acids combining in exactly the right order for to construct a 250 nucleotide bases in RNA which is necessary

The world easily could have remained lifeless,
It is an astonishing stroke of luck that we are
here!

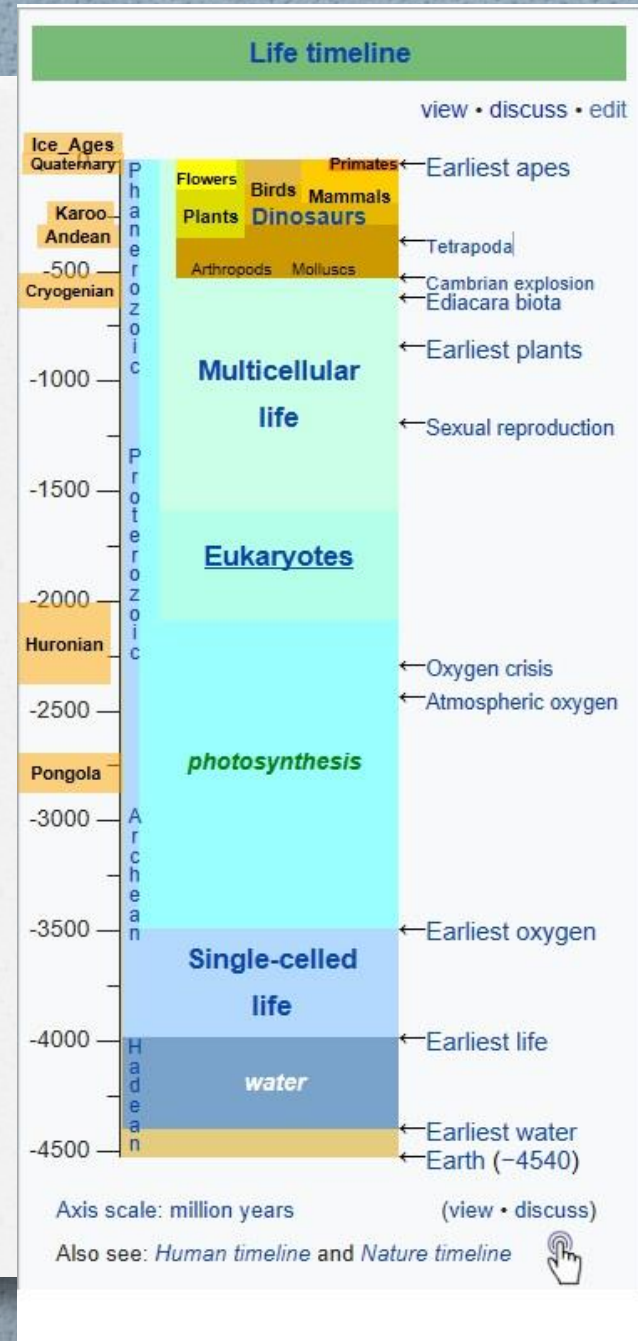
Richard Dawkins
Evolutionary Biologist

A scientist believing in LUCK!!!!

statistically occur for one protein much less all the biological proteins etc. involved.

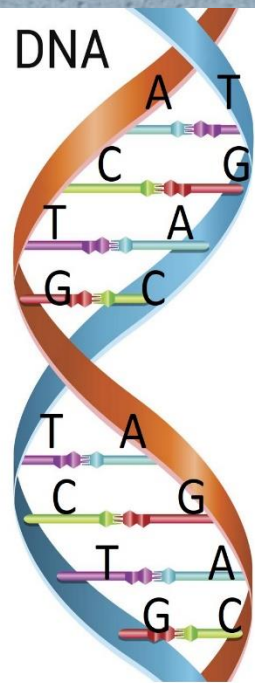
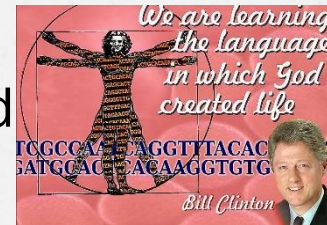
How Old is Life?

- The oldest evidence of life scientists has found is **3.86 Billion years old**, which corresponds to the oldest rocks (non-meteor) scientists have found
 - Evidence of Simple Life in the form of residue of bacteria has been found in the oldest rocks dating back to **3.86 Billion Years** (a short time after the LHB at 3.9 Billion years)
 - “Building Block materials for more complex life” (necessary to manufacture proteins, DNA, RNA, lipids, and polysaccharides) and carbonaceous materials are found
 - The earliest simple life found shows no evidence of coming from **INORGANIC materials** (material not from carbon-based life), but come from pre-existing living materials (as determined by the ratio of C12 to C13, N14 to N15)
- Sounds so simple in 640 Million years after the Earth’s formation, 40 million after LHB life takes off.



Information Required (Planning)

- DNA has been called “the Language in which God created Life” (Bill Clinton-June 26, 2000)
- Every DNA biological molecule is specified specific sequence of 4 nucleotide bases—
A Adenine, T Thymine, G Guanine and C Cystosine,
- Their sequence defines the size, shape, and functionality of any protein, enzyme, etc. that are manufactured in the cell
 - Ex. ACTGTCTGAAGTTGCAC etc.
 - In a double strand DNA, A's match with a T on the opposite strand and C's match up with G's.
- If one or more of the bases are out of order, the protein may become dysfunctional. Typically **1000 or more bases** are in a protein



A—T
C—G
T—A
G—C
T—A
C—G
T—A
G—C
A—T
Etc.

Let's see Information in Action: Complex Manufacturing within the Cell

- o The Cell Factory 4 minute video
 - o Unlocking the Mystery of Life – IllustraMedia.com
- o Researcher – Dean Kenyon, PhD
 - o Author of *Biochemical Predestination*
 - o A Standard textbook for 20 years
 - o A Book suggesting all Biochemicals are pre-destined to randomly occur
 - o He changed his Mind!
 - o Why? Because of the discovery of DNA and its requirements to have absolute design structure
 - o That is a specific sequence must be defined

Unlocking the Mystery of Life– IllustraMedia.com



Bad Statistics

- [illegible]

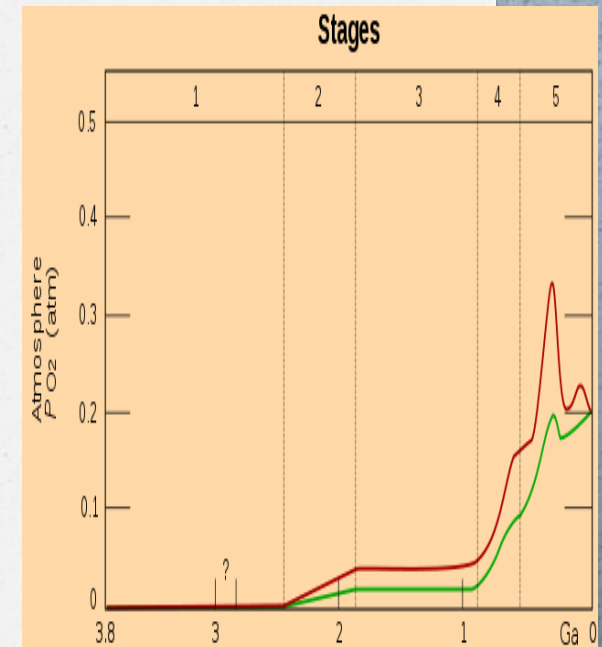
Flipping Coins

Problems with Spontaneous Life

- o At the time of the oldest rocks (3.9 Billion years ago) there is already life.
- o Life originated in water
 - o But how? Again, water is hardly a stable environment. H_2O is a solvent!
 - o There has been shown that there are no pre-biotic molecules sitting around in pools of water as Carl Sagan suggested in the 1980's.
- o Irregardless, there is **no necessity to believe:**
 - o That life came from a single first cell, as Darwin had thought
 - o That life evolved in a gradual process
 - o advancement of life will be shown to be occurred by catastrophic events followed by gradual processes

Life Did Begin Somehow But are Advancements (Biologic Evolution) a Gradual Process?

- **The first organisms were anaerobic** and existed before the LHB.
- The atmosphere had large amounts methane, encouraging methane consuming organisms to increase, releasing CO₂ and reducing the atmospheric temperatures
- High levels of CO₂ encourage growth of photosynthetic organisms which release oxygen
- Leads to plants?
- Leads to animals?



Billion Years Ago

Oxygen Levels

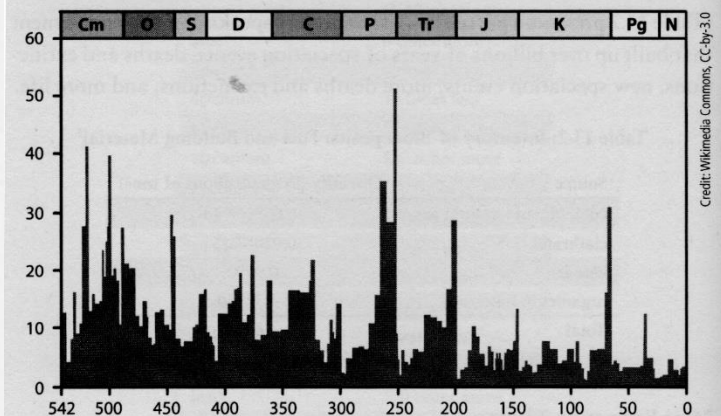
Life Improves with Events - A few examples

Not a Gradual Process

- Gaskiers Glaciation (579 million years ago - mya) resulted in delivery of phosphorus and other nutrients to the oceans and a major increase in the photosynthetic organisms and oxygen rich waters and the explosion of Ediacaran species
- Along the way, **mass extinction events** occur about every 26-30 Million years over the last 575 Million years



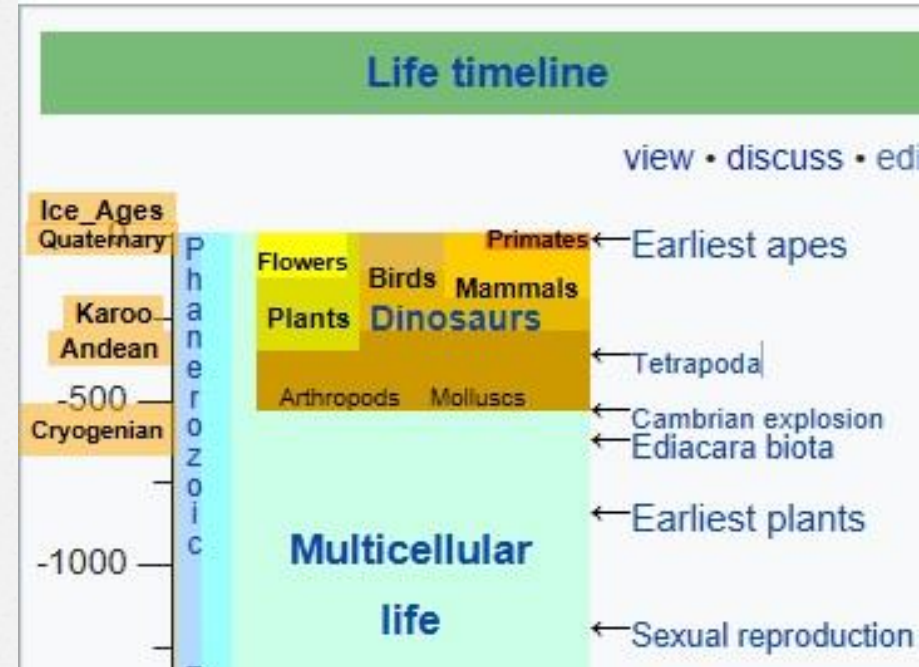
Figure 13.1. Extinction of Marine Animal Genera since Cambrian Explosion



The x-axis extends back 542 million years. The y-axis shows the percentage of marine animal genera that went extinct at any given time.

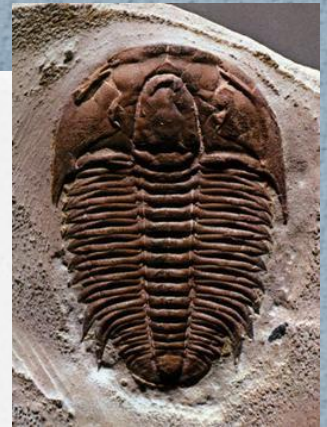
Life Improves with Events

- Within a Million years of the mass extinction of the Ediacaran species due to climate change, the famous **Cambrian Explosion** (542 mya) occurred
- New life forms
 - 50 to 80% of animal phyla
- With skeletons
 - Vertebrates and invertebrates
 - Internal and external skeletons
 - Rigid and flexible skeletons
 - Fixed. Molting, remodeling
- Eyes with cornea and lens
- Predator-prey relationships
- If one assigns the existence of the earth to 24 hours, then the Cambrian explosion would be just 2 minutes!!



The Problem of the Lack of Pre-Cambrian Fossils

- Charles Darwin knew this to be a problem with his theory
 - He knew Trilobites and other forms had no predecessor's fossils
 - Expected a Fossil Record would eventually be found
 - One which showed gradual change over time
 - But the opposite has happened
- 5 minute video on the Cambrian Explosion
 - Darwin's Dilemma – IllustraMedia.com
 - With Permission



Darwin's Dilemma – IllustraMedia.com



Life Improves with Events - A few examples

o **The Ordovician-Silurian Transition** 444mya

- o Caused by plate movement, glaciers, volcanoes, sun's intensity rose
- o 85% of all marine species became extinct
- o New life followed - Jaw and bony fish, Arthropods on land, Vascular plants on land

o **Permian-Triassic Extinction** 250 mya

- o 90% of marine species; 70% of land species
 - o Water temp rises from 70F to 90F for 5 million years

o **Triassic recovery** 251-201 mya

- o Dinosaurs and mammals, Seed plants dominant
- o Herbivores, carnivores, parasites, and detritivores (fed on dead plants, animals, waste products)
- o All in beneficial ecologic harmony

o **Cretaceous-Paleogene extinction** 66 mya

- o Dinosaurs disappear

But What About Man?

There is ample evidence to suggest that an evolving process IS PART of the process after Cambrian Explosion:

- o Man's body has DNA and other attributes that do belong in the same category as elements of life.
- o Plants share the 50% of the DNA sequences with man
- o Apes share 85% to 95% (some say 99%) of the DNA sequences with man
- o Man has 23 pairs of chromosomes and Apes have 24 pairs of chromosomes
 - o Man's #2 chromosome is extra long
 - o Man's #2 chromosome has two endcaps in the middle of the chromosome
 - o Ape's have 2 chromosomes –which when combined results in a chromosome nearly identical to a human's #2 chromosome
- o Ape's are social, make tools, are bipedal, with limited language and facial expressions (but are not concerned with transcendentals)



But What About Man?

Man's Chromosome #2

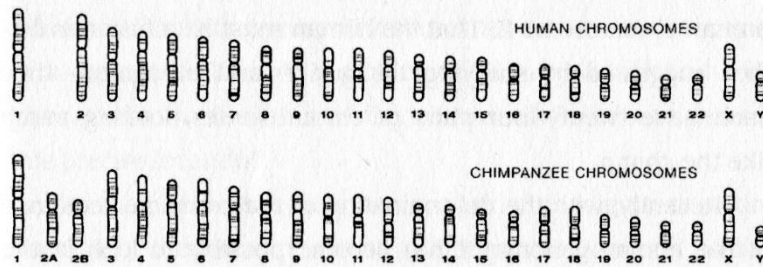
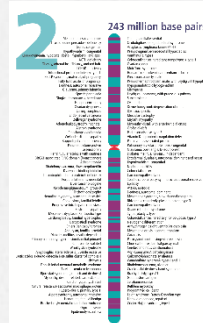


Figure 5.3 The human and chimpanzee chromosomes, or “karyotypes.” Note the marked similarity in size and number, with a notable exception: human chromosome 2 seems to be made up of a head-to-head fusion of two intermediate-size chimp chromosomes (here labeled 2A and 2B).



enancy, and red hair
 LCHAD deficiency
 deficiency, type 1
 rial, of pregnancy
 ute, of pregnancy
 isosomal recessive
), primary infantile
 Spastic paraplegia
 atosis, hereditary
 toluprosencephaly
 ovarian dysgenesis
 Carney complexes
 metrical carcinoma
 allweger syndrome
 ystrophy, neonatal
 Alstrom syndrome
 lampaia/clamperia
 er distal myopathy
 ht chain deficiency
 eatic stone protein
 Lissencephaly
 osis with deafness
 ain (breast cancer)
 Achromatopsia
 down-regulated in
 n-binding inhibitor
 C deficiency
 lminans, neonatal
 r cancer oncogene
 nentum, group B
 ichthiodystrophy
 isosomal recessive
 ns, familial febrile
 hepatic cholestasis
 Edstrom myopathy
 a, Kantaputra type
 milial hypertrophic
 tie-Biedl syndrome
 Danlos syndromes
 m, familial arterial
 insulin-dependent
 (familial primum)

- Ovarian cancer
- Muir-Torre syndrome
- Human T-cell leukemia
- Precocious puberty, m
- Pseudohermaphroditis
- Hypogonadotropic hyp
- Micropenis
- Leydig cell adenoma, t
- Sitosterolemia
- Cystinuria
- Doyle honeycomb de
- Dyslexia, specific
- Muscular dystrophy
- Myositis myopathi
- Myopathy, distal, with
- Orofacial cleft
- Parkinson disease, typ
- Vitamin K-dependent
- Pancreatitis-associated
- Pulmonary alveolar pr
- Glaucoma, open angle
- Diabetes mellitus, non
- Ectodermal dysplasia,
- Hypothyroidism, cong
- Nephronophthisis
- Colorectal cancer, her
- Cardiomyopathy, dilat
- Spastic cerebral palsy,
- Epilepsy
- Ataxia, episodic
- Deafness, autosomal c
- Myasthenic syndrome
- Rhizomelic chondro
- Cardiomyopathy, dilat
- Duane retraction synd
- Synpolydactyly, type II
- Colorectal cancer, her
- Neurogenic differentia
- Arrhythmogenic right
- Myasthenia gravis, ne
- Cataracts
- Paroxysmal nonkinetic

Adrenoleukodystrophy, neonatal
Alstrom syndrome
Preeclampsia/eclampsia
Welander distal myopathy
Kappa light chain deficiency
Pancreatic stone protein
Lissencephaly
Renal tubular acidosis with deafness
BRCA1-associated RING domain (breast cancer)
Achromatopsia



- Myopathy, distal, with anterior tibial onset
- Orofacial cleft
- Parkinson disease, type 3
- Vitamin K-dependent coagulation defect
- Pancreatitis-associated protein
- Pulmonary alveolar proteinosis, congenital
- Glaucoma, open angle, B (adult-onset)
- Diabetes mellitus, non-insulin-dependent
- Ectodermal dysplasia, autosomal dominant and recessive
- Hypothyroidism, congenital

But Aren't there Holes in the Evolution THEORY?

○ Evolutionists rely on random mutations and time

- By Evolutionary Biologists own calculations, the Cambrian Explosion would have taken at least 200 Million years instead of the 1 Million or less time period
- Even the simplest of cells is utterly complex. It has been estimated that the likelihood of a positive change in an enzyme is **1 in 10^{70}** .
- Biological systems are said to be IRREDUCIBLY COMPLEX.
 - Ex. A mousetrap has 5 components (base, metal “hammer”, spring, catch, and a holding bar). The units are independent and do not self assemble. There is no successive slight modification which will result in a complete mousetrap. If any part is missing or fails, the mousetrap does not come into existence and certainly doesn't replicate
 - Cells, eyes, nerves, photosynthesis, etc. are far more complex. They rely on the presence of multiple other precursors.
 - The Transcendentals cannot be weighed, measured, etc. or passed on to one's progeny.

The Church does not require a MIRACLE be declared, but allows Science to struggle with these issues

The Problem of the “God of the Gaps”

As has been explained, there were many things that happened against all reasonable probability just at the right time and the right way—“**The Goldilocks” conditions** just to get where we are today.

- o Many believe God stepped in at the right times and made it happen. This is called the “God of the Gaps” approach.
- o The problem with this approach is science may find a reason why something occurred. Then one must backtrack one’s beliefs.
- o As Catholics, we believe that God created everything with a purpose as planned in an orderly fashion because of the love of God for man.
 - o God therefore could have chosen the laws of physics and set things in motion to make things happen perfectly, or
 - o God could step in at the right time and make miraculous events so that the Goldilocks conditions result.
 - o Or even, God made everything in six days, but made it look, for reasons unknown, as if the Universe is much older and that evolution occurred, but why would God deceive?
- o We can believe any of these ways or some combination, **but we must believe God created all in a planned process.**

One is left with the possibilities

- o Things just have to happen this way
 - o **But they don't** - Whether talking about Physics constants or the perfect timing of events, there is no reason at all to suggest that our Universe, our Galaxy, etc. must develop in an exact way resulting in an Anthropic pathway to intelligent life
- o We just got lucky
 - o **No one is this lucky**- The numbers are so fantastic whether speaking about the strictly physical or the life-related realities, in all areas
- o Aliens helped with the Biological process
 - o Many do believe this, but this doesn't answer the initial origin questions. And where are these people and why would they do this if they are not going to any person-to-person relationship with us?
- o God really did want to create man and a home for man
 - o God really did make us transcendent persons who can reason, have free will, and can love

Materialist support

- o Is Earth just a random happening?
- o Are humans (as Carl Sagan has said) “*inconsequential, a thin film of life on an obscure and solitary lump of rock and metal*”
- o Didn't we just see that Earth and Mankind should not even exist, but do?
- o Don't Atheists also admit that life is not a random event:
 - o When they say
 - o “everything appears as if it were *designed*” (Richard Dawkins)
 - o “*Biologists must constantly keep in mind that what they see was not designed, but evolved*” (Francis Crick, Nobel Prize for DNA)
 - o When they write a book entitled *The Grand Design* (Steven Hawking)

Conclusion (cont.)

- Isn't the real problem the False Postulate that
 - All things must arise from physical matter
 - We must throw out evidence if it doesn't agree.
- We must admit that there is something beyond physicality
 - That Miracles such as the Eucharistic Miracle at Lanciano, Italy do exist
 - That we transcend our physicality when we love, have empathy, have a conscience, are creative, etc.
 - That we are Body and Soul



We must keep in Mind the FULLNESS OF REALITY so that we may more fully understand

Is Evolution Catholic?

◊ God created all from Nothing - CCC 295

- ◊ Science agrees the universe arose from the sudden appearance of a pinpoint of energy in a space that did not previously exist

◊ In an Orderly, Planned Process – CCC 299

- ◊ Science agrees
 - ◊ With FINETUNING
 - ◊ A myriad of unlikely STEPS had to occur to produce an inhabitable Earth suitable for our society
 - ◊ INFORMATION is necessary for life
 - ◊ At the right TIME
 - ◊ STATISTICALLY impossible in a random process

◊ For the sake of Man - CCC 358

- ◊ Not a question for Science. What we know they can't admit

