



# Science and Faith: Implications for Genetic Medicine and the Christian Perspective

January 23, 2011  
Mark Reynolds

# What does the Bible say ?

- *“In the beginning, God created the heavens and the earth”*  
Gen 1:1
- *“For by him all things were created ... and in him all things hold together”*  
Col 1:16,17
- *“In the beginning was the Word ... and the word was God”* John 1:1

# Seeking Truth: The Judeo-Christian Perspective



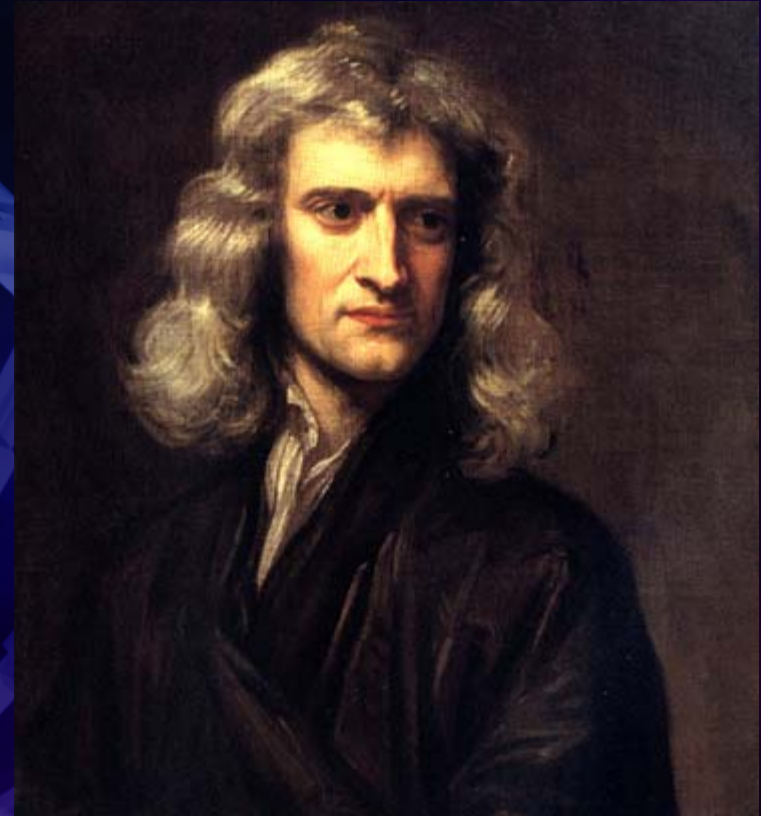
- The universe that God created is both physical and spiritual
- We must seek both physical and spiritual truth in order to properly understand the world that we live in
- The two are not mutually exclusive
- What we learn from science can inform our understanding about the existence and nature of God

# Scientific Pioneers Were Christians

## *Isaac Newton*

*Classical physics, calculus*

- “This most beautiful system of the sun, planets, and comets could only proceed from the counsel and dominion of an intelligent and powerful Being. And if the fixed stars are the centers of other like systems, these, being formed by the likewise counsel, must be all subject to the dominion of One” (Mathematical Principles of Natural Philosophy).
- Newton wrote more about theology than science.



# Scientific Pioneers Were Christians

## *Blaise Pascal*

*Probability theory, mechanics*

- God makes people “conscious of their inward wretchedness and his infinite mercy, unites Himself to their inmost soul, fills it with humility and joy, with confidence and love, renders them incapable of any other end than Himself. Jesus Christ is the end of all and the center to which all tends.”



# Naturalism: When Science Trumps Faith (but does it really?)

- The basic belief of naturalism is that scientific knowledge is the only kind of knowledge, or is at least vastly superior to other kinds of knowledge.
  - *This is self-refuting! How can it be tested scientifically?*
- The physical world is all there is and is responsible for all that we see and experience.
  - *This is a faith-based statement!*

*Our worldview informs how we interpret both scientific truth and spiritual truth. We can weigh the veracity of a worldview based on how well it conforms to reality.*

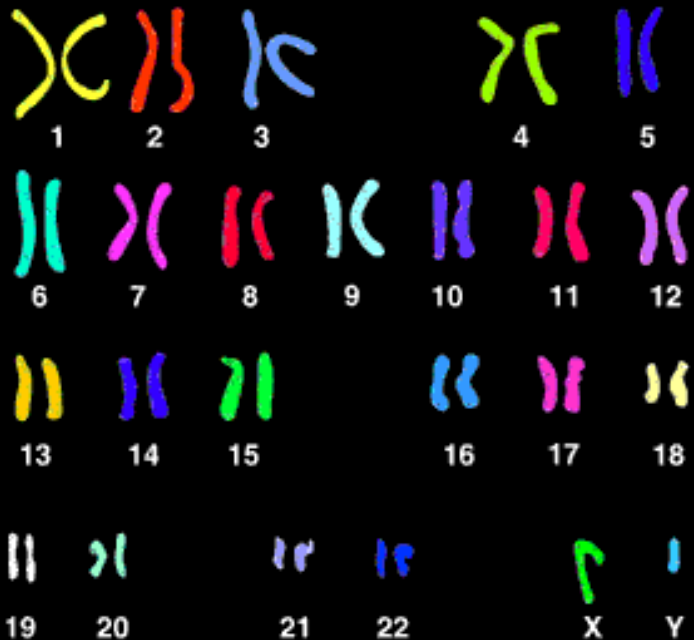
# Chemistry & Biology: Biogenesis

- For the first 500 million years, earth's environment was inhospitable to life
- But life arose within a 150 million year span afterward
- Living things are, by definition, self-replicating – DNA is required
- Even the simplest bacteria require several hundred genes to function – hundreds of thousands if not millions of bases!



# Chromosomes

- Organized structures of DNA and proteins that are found in cells
- Contain a single continuous piece of DNA
  - Contains many genes, regulatory elements and other nucleotide sequences
- Contain DNA-bound proteins, which serve to package the DNA and control its functions
- Word chromosome comes from the Greek χρώμα (chroma, color) and σῶμα (soma, body) due to their property of being stained very strongly by some dyes



<http://www.laskerfoundation.org/rprimers/gnn/wagn/images/karyotype.gif>

Mary S. Gibbs (GNN)

# DNA

- **Deoxyribonucleic acid**
  - The substance of inheritance
  - The most celebrated molecule of our time
  - Timeline: <http://www.dnai.org/>
  - History:  
<http://www.pbs.org/wnet/dna/episode1/index.html>
- **Discovery was a race**
  - Rosalind Franklin and Maurice Wilkins
  - Linus Pauling
  - James D. Watson and Francis Crick
    - Determined the DNA structure first, in 1953
    - **J.D. Watson and F.H.C. Crick, "Molecular Structure of Nucleic Acids: A Structure for Deoxynucleic Acids". Nature 171 (1953):738.**
      - » Achievement led to their Nobel Prize in 1962

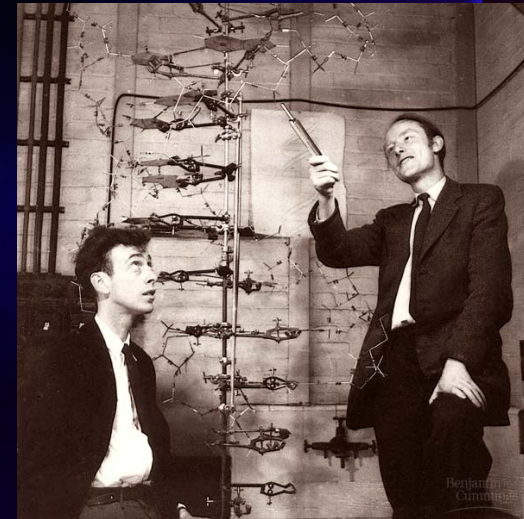
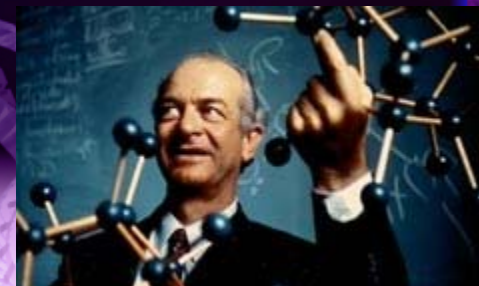


Figure 16.0 Watson and Crick



Rosalind Franklin



Linus Pauling

# Central Dogma

**DNA**  
↓  
**RNA**  
↓  
**Protein**

**Genotype**

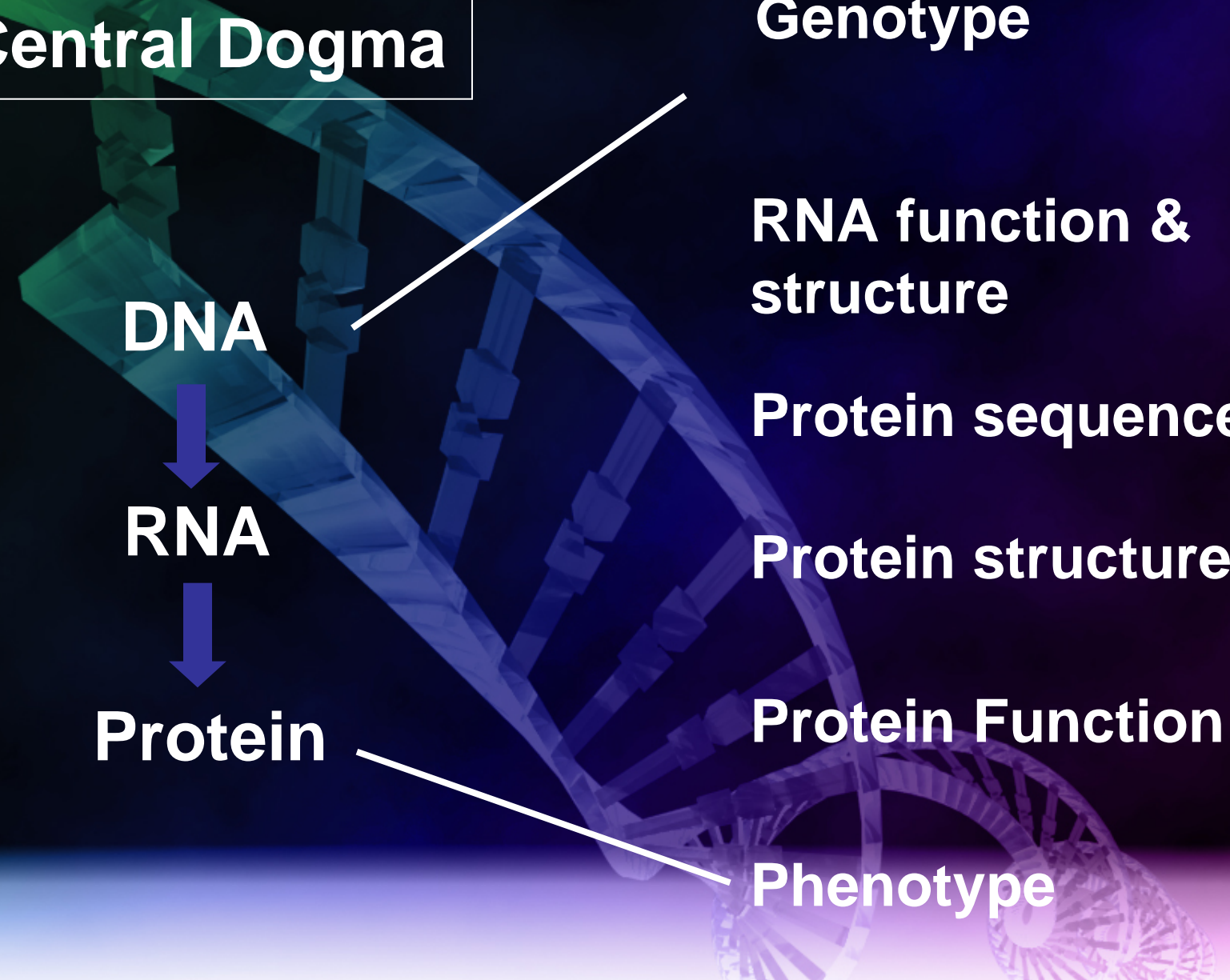
**RNA function & structure**

**Protein sequence**

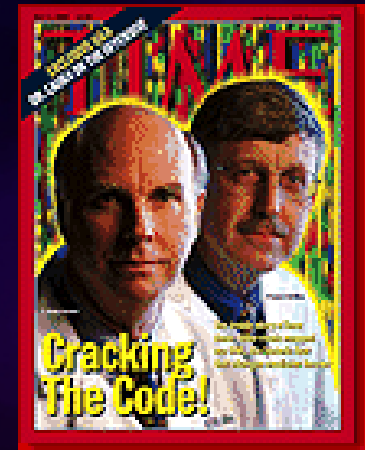
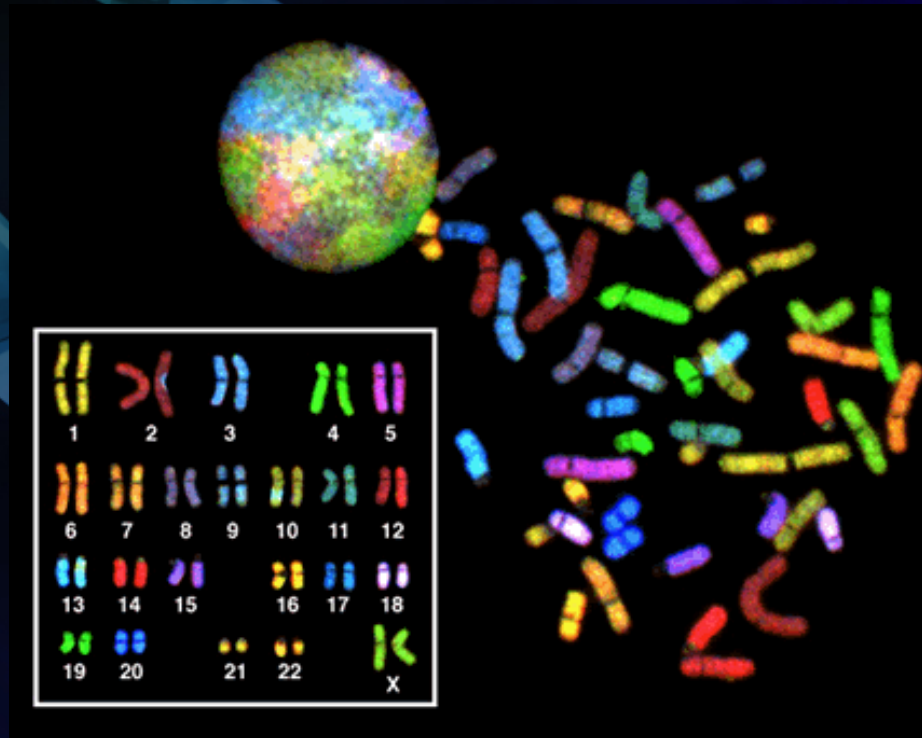
**Protein structure**

**Protein Function**

**Phenotype**



# The Human Genome Project



**3 billion bases      30,000 genes**

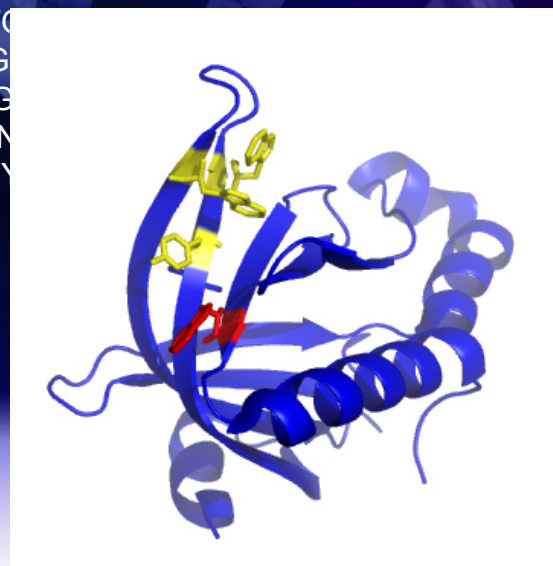
<http://www.genome.gov/>

# What's in a gene?

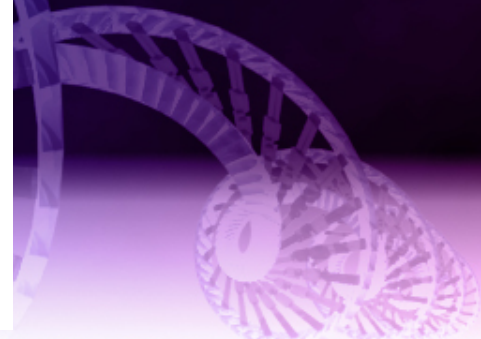
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TATCAAGGTGTTTTGGCCATATATTTGAGAGACGTCTCGCAAATAACAAATCTTCTACCC  
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AACAAATGGTTCTGACAATAGCAACAGGAATAGCAGTGGAAATGGGAACTCTTATAAAAAGT  
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GGATTGATCATATTAACCGAATTAATCCTGACAATTTTTCTATGGGCATTGTTCCCAAT  
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TGCATGGGGGTAGAGGTGAAAGATGAATTGGTCATTATTAAGA ACTTGAAGCATGAGGTC  
TATGGTATATGGATTCATACAGTTAGTGATAGACAAAATATCTACGAACTAATAAAAATAT  
CTTCTGAAAATGAGCCAAAAGATTCTTTTGCTTGA



MTGAATAAEN SATC  
FKKDEWNKLE YQG  
NNGSDNSNRN SSC  
DNFSMGIVPN SVVN  
YGIWIHTVSD RQNI



TPHASLYKWD  
D SQNGSNNIQV  
NY GLIILNRINP  
EL VIIKNLKHEV



# Genomics



**Study of sequences, gene organization & mutations at the DNA level**

**the study of information flow within a cell**

# Impact of Genomics on Medicine



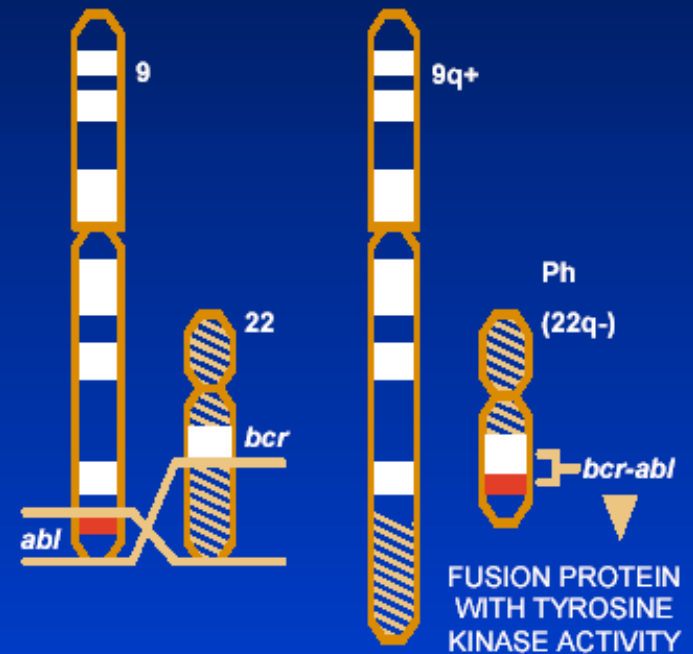
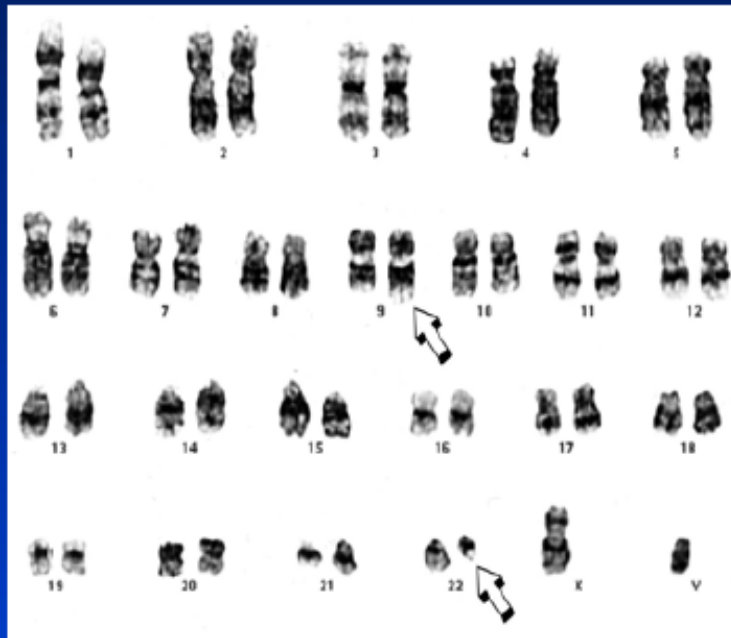
- **How to characterize new diseases?**
- **What new treatments can be discovered?**
- **How do we treat individual patients? Tailoring treatments?**

# Implications for Biomedicine



- **Physicians will use genetic information to diagnose and treat disease.**
  - **Virtually all medical conditions have a genetic component**
- **Faster drug development research: (pharmacogenomics)**
  - **Individualized drugs**
- **All Biologists/Doctors will use gene sequence information in their daily work**

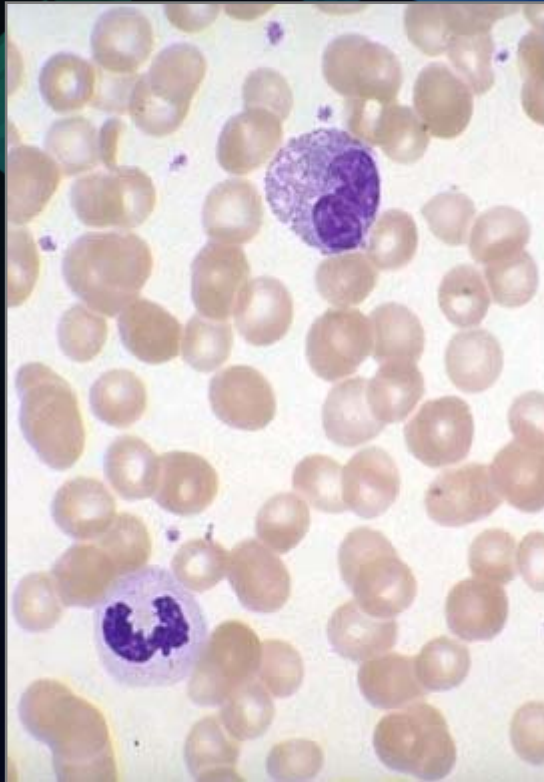
# Chronic Myeloid Leukemia – The Philadelphia Chromosome



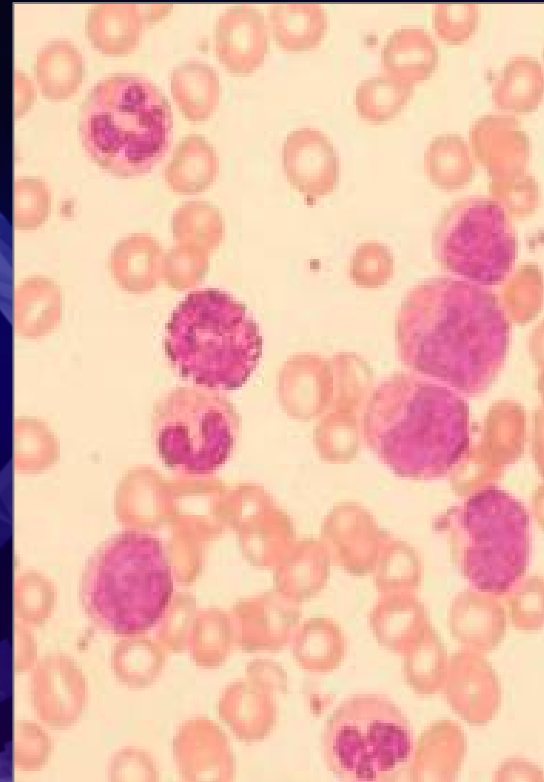
The Philadelphia (Ph) Chromosome: t(9;22) Translocation

# CML – A Myeloproliferative Disorder

Normal



CML Chronic-Phase



# Targeted Drug Therapies Enabled Through Genomic Medicine

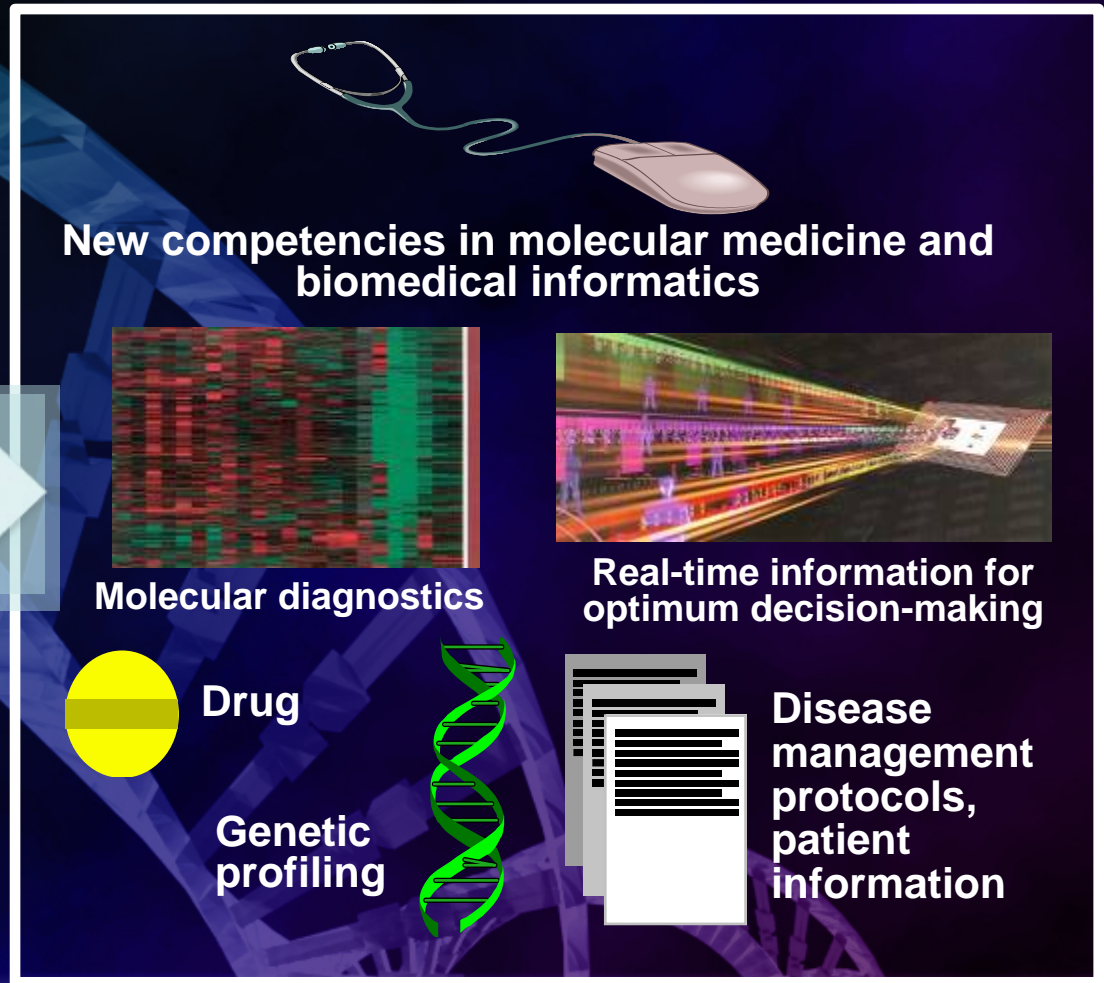


# Evolution of Molecular Medicine: Foundation for Rational Care and Personalized Medicine



**Rx 2008**

*Source: George Poste*

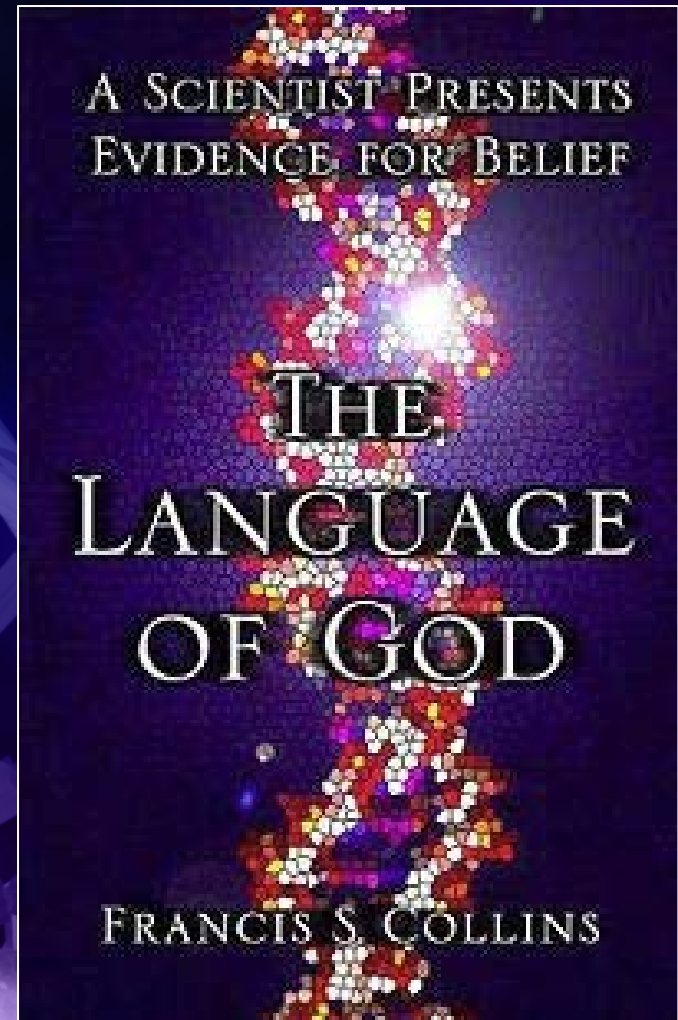


**Medicine 2020**

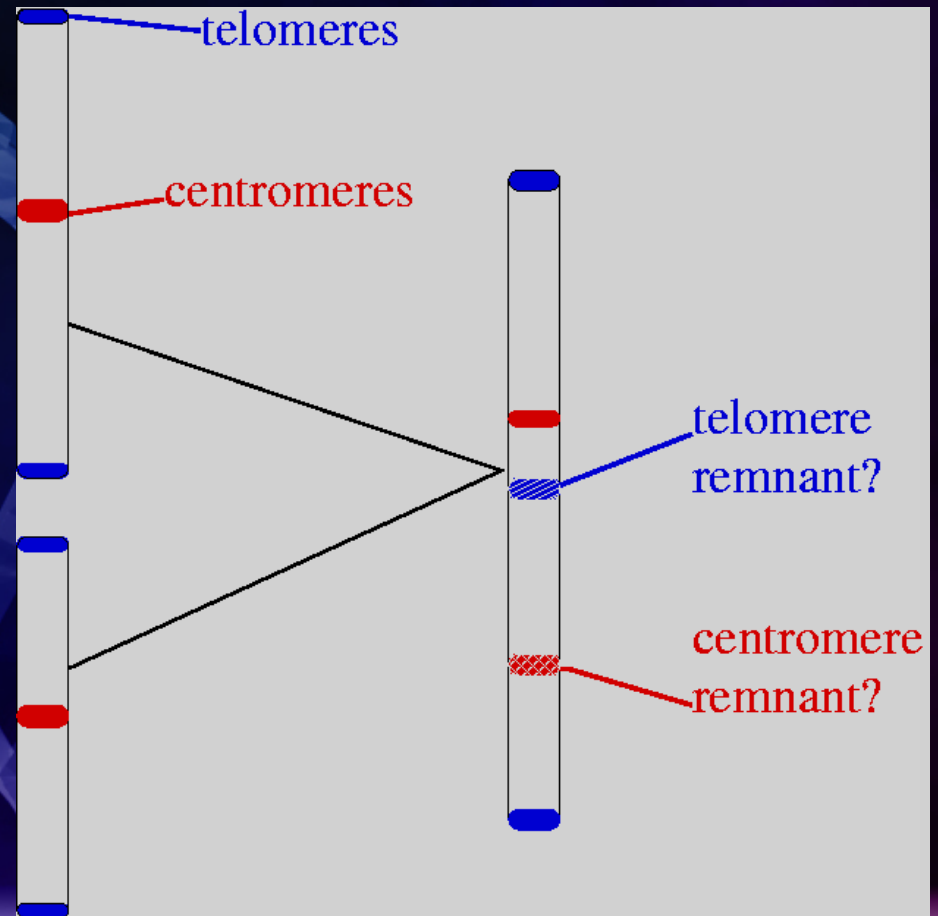
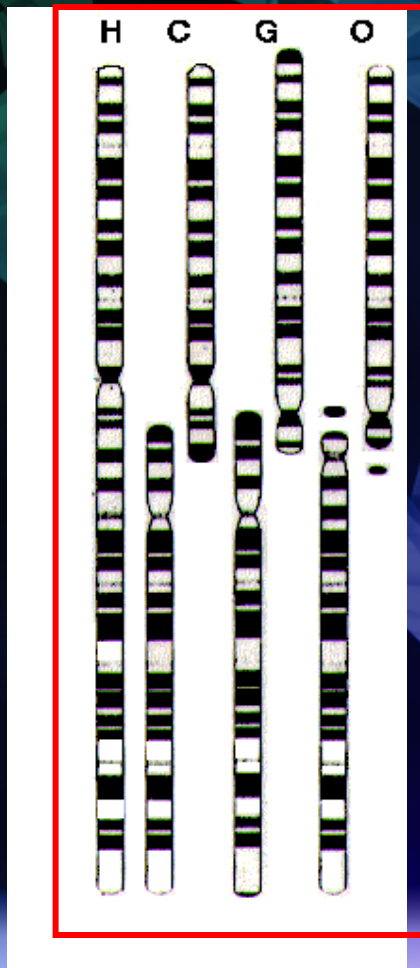


# Pseudogenes

- Pseudogenes are evidence of genomic copying from lower life-forms
- Fused human chromosome #2 is evidence of descent of humans from apelike animals
- Info primarily from Francis Collins' book "The Language of God: A Scientist Presents Evidence for Belief"

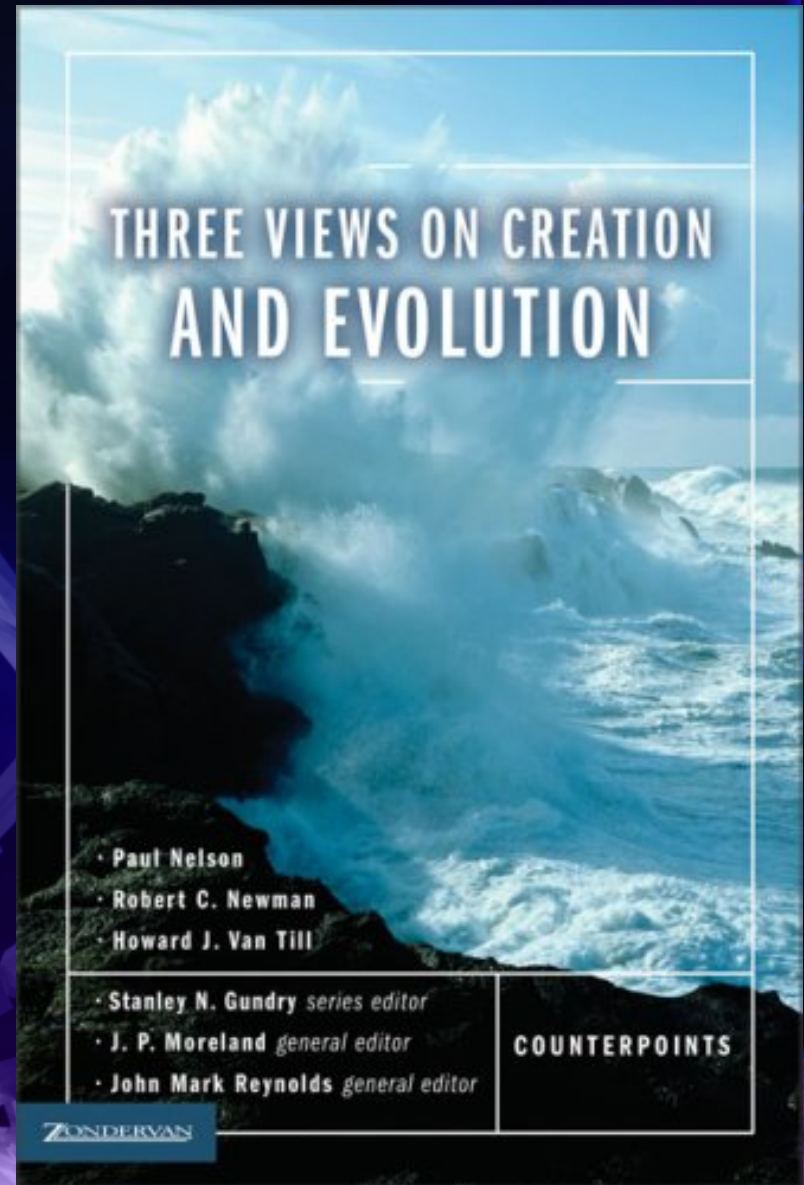


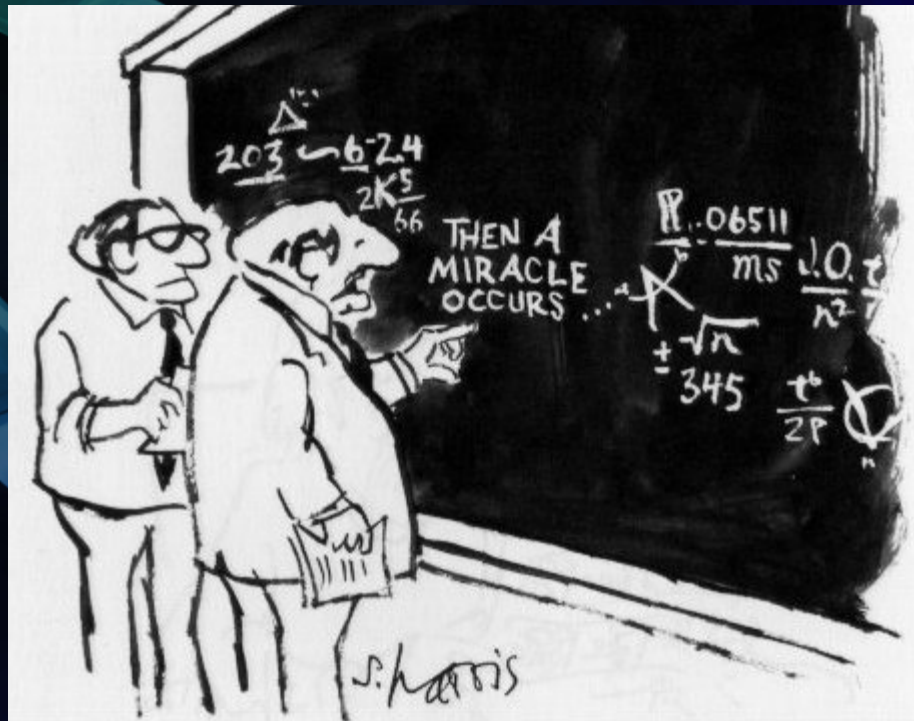
# tapestry arguments in biology: fusion of chromosome 2?



chromosome 2: Human, Chimp, Gorilla, Orang-utan

- DNA provides “overwhelming evidence” that evolution actually happened, but that does not mean there is no God.
- It is very common to conflate evolution with atheism, but it is an error. Christians can also claim evolution as God’s marvelous design method (Howard Van Till’s “Fully Gifted” theology).





"I think you should be more explicit here in step two."

from *What's so Funny about Science?* by Sidney Harris (1977)

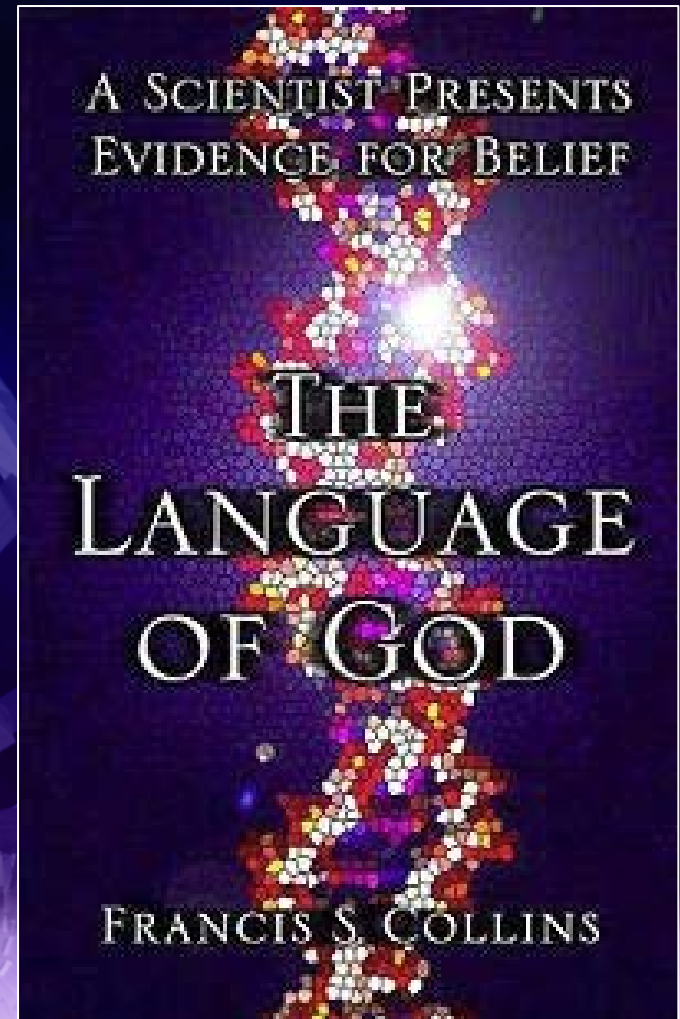


# Francis Collins

Director of the National Institutes of Health

“In my view, there is no conflict in being a rigorous scientist and a person who believes in a God who takes a personal interest in each one of us. Science’s domain is to explore nature. **God’s domain is in the spiritual world, a realm not possible to explore with the tools and language of science.** It must be examined with the heart, the mind, and the soul—and **the mind must find a way to embrace both realms.**”

From *The Language of God*, p. 6



# Advice from Billy Graham

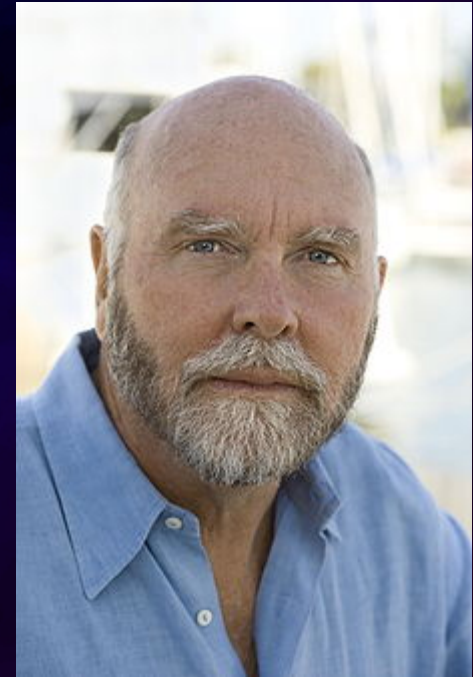
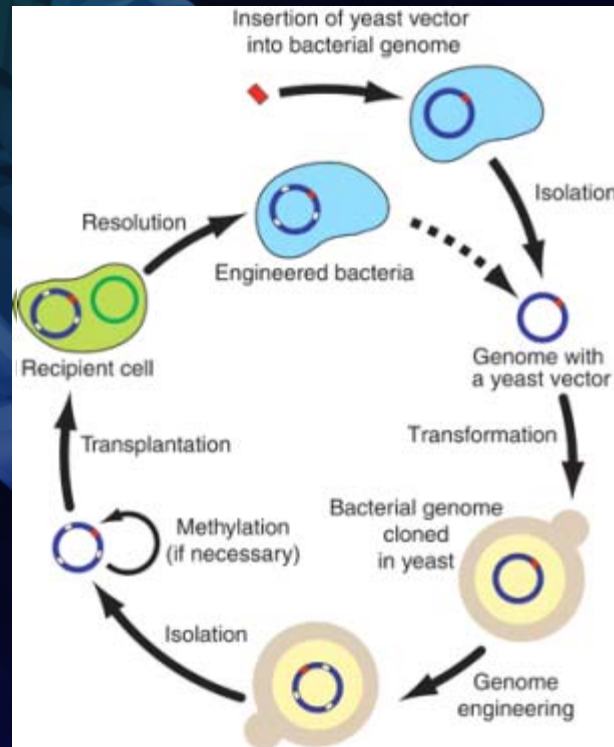
"I don't think that there's any conflict at all between science today and the Scriptures. I think that we have misinterpreted the Scriptures many times and we've tried to make the Scriptures say things they weren't meant to say, I think that we have made a mistake by thinking the Bible is a scientific book. The Bible is not a book of science. The Bible is a book of Redemption, and of course I accept the Creation story. I believe that God did create the universe. I believe that God created man, and whether it came by an evolutionary process and at a certain point He took this person or being and made him a living soul or not, does not change the fact that God did create man. ... whichever way God did it makes no difference as to what man is and man's relationship to God."

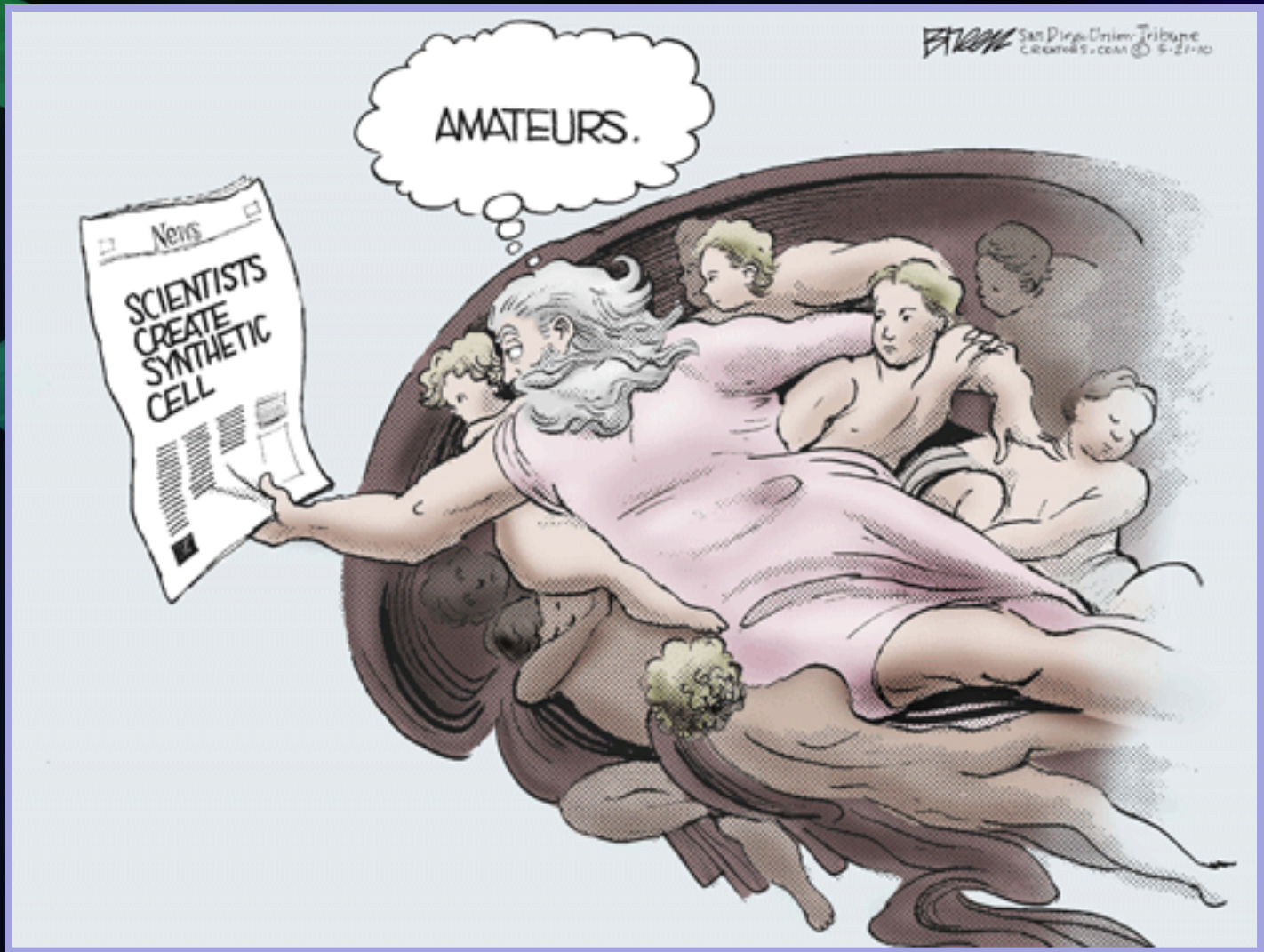
- – Billy Graham quoted by David Frost
- Source: Book - Billy Graham: Personal Thoughts of a Public Man (1997, p. 72-74)

# Scientist Craig Venter Has Created Artificial Life



The DNA for the new organism was cloned in yeast. The membrane was produced by a similar cell. The result is a viable, artificially created organism. (Source: Science)





BROWN San Diego Union-Tribune  
CREATING.COM 5-21-10

Union-Tribune, May 21<sup>st</sup>, 2010

## Questions:

- How then shall we live in the age of genetic testing?
- What perspective does our faith grant us on these developments?
- In what ways do we have power and choice?
- What do we think God's intentions are in all of this?
- What should this church, and we as members of it, be saying both in the public debates and about the decisions that need to be made?