Information: The Basis For Life

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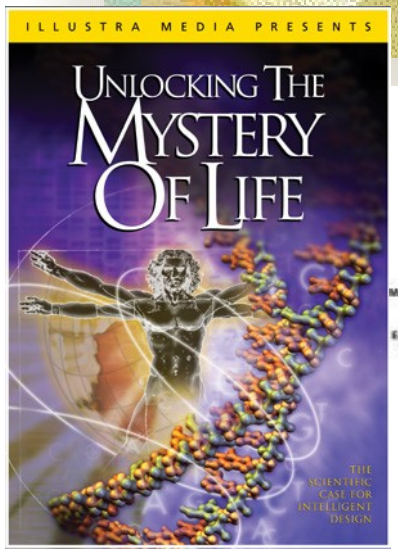
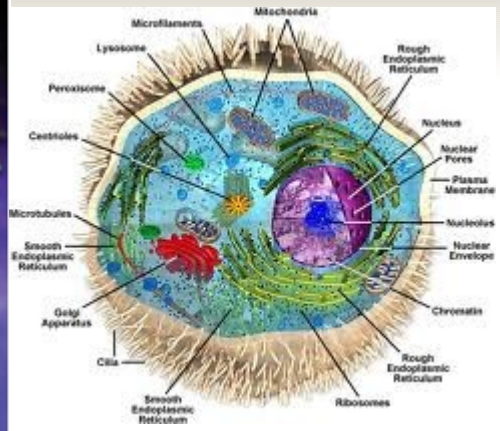
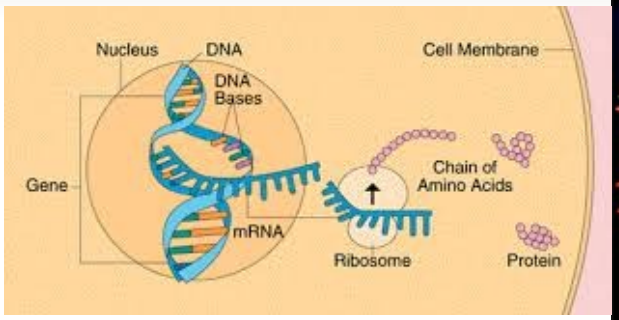
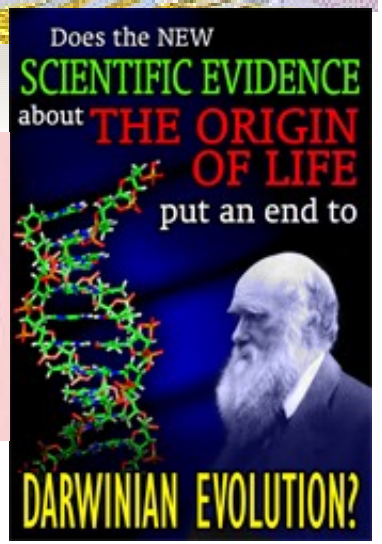






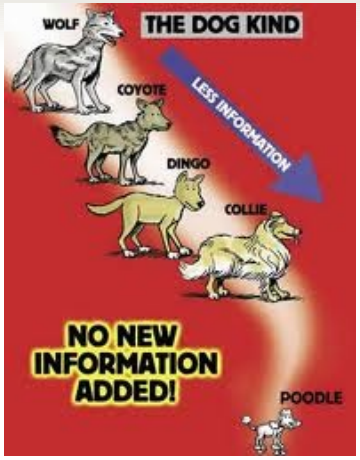


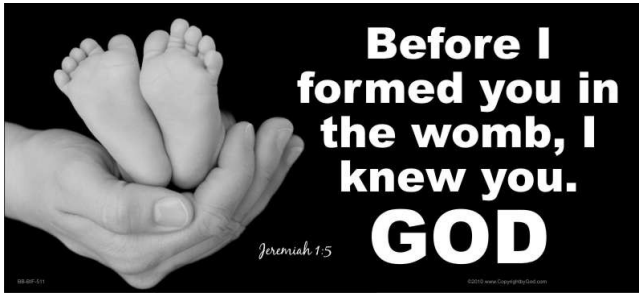
Information: The Basis For Life

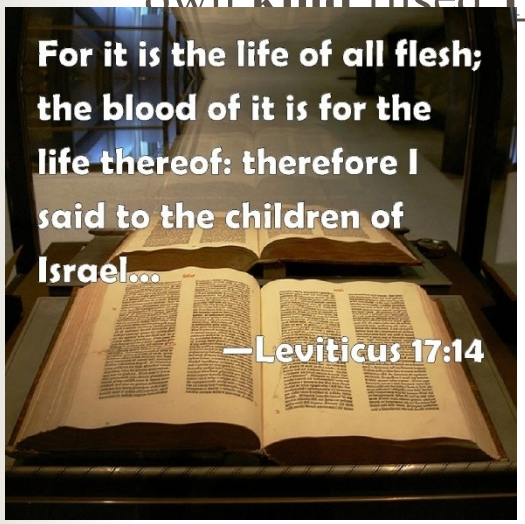
1. Views of Life – Creation or Evolution?
2. Chance, Necessity (Law) or Design?
3. Presuppositions & Information
4. The Nature of Information
5. The Nature of Machines
6. The Nature of Programs
7. Life: Information, Complexity, Design
8. Mathematical Probability
9. Life From Non-life By Chance?
10. In Conclusion

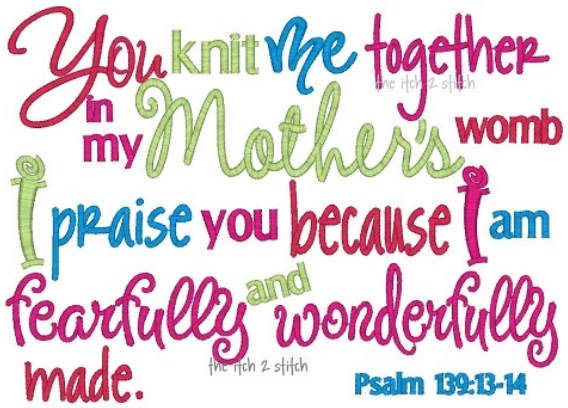
1a. Biblical View of Life

- **Gen. 1:11-12, 21, 24-25**, "…herb that yields seed <u>according to its **kind**</u>, …, beast of the earth <u>according to its **kind**</u>."
  - Indicates stability of different **<u>kind</u>**s
  - **<u>Biogenesis</u>**, each producing <u>after its own **kind** [used **10** ti</u>

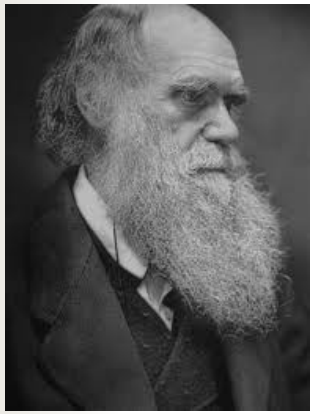




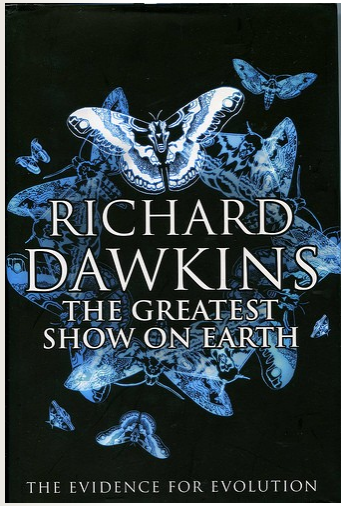




1b. Evolution's View of Life



- Related through <u>common ancestry</u>
- Arose through <u>mutations</u> and <u>natural selection</u>
- By means of random <u>chance</u> processes of nature



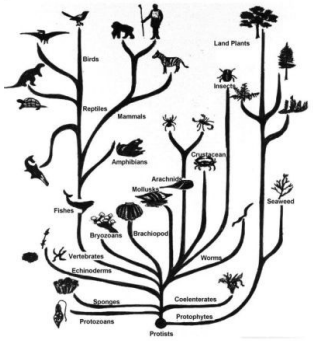
The story of evolution:

Origin of the Universe → Origin of Earth → Pre-Biotic Synthesis ("primordial soup")

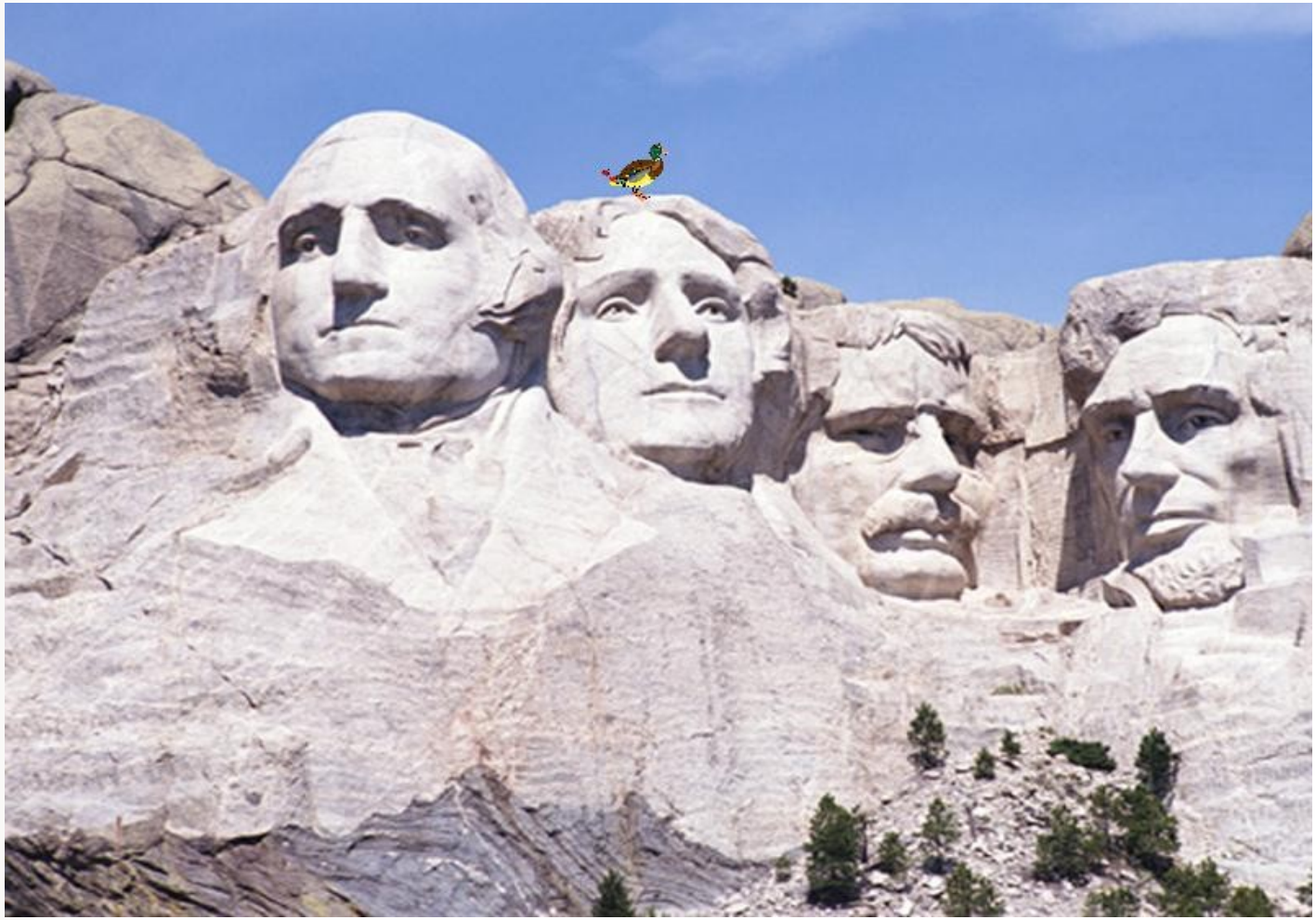
Bacteria ← First Cells ← DNA / Protein World ← RNA World

Primitive Animals → Fish → Amphibians → Reptiles* → Mammals

Humans ← Hominids ← Early Apes ← Monkeys ← Lower Primates

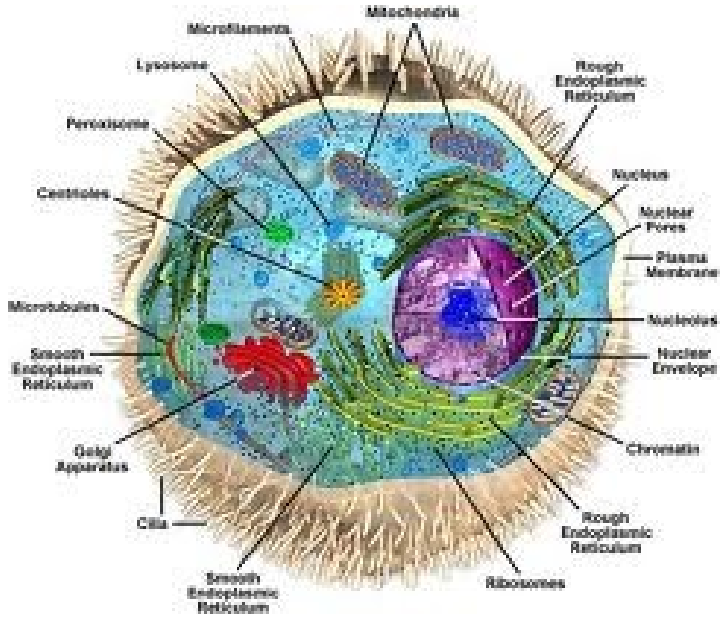


2. Chance, Necessity (Law) or Design?



Living Cell Requirements

1. Proteins – chain of amino acids
2. DNA (DeoxyriboNucleic Acid)
   - Double helix
   - Master genetic code
   - Information for cell activities
3. RNA (RiboNucleic Acid)
   - Single strand
   - Protein building instructions
4. Catalysts for transcription
5. Replication
6. Cell membrane
7. "Chicken and egg" problem

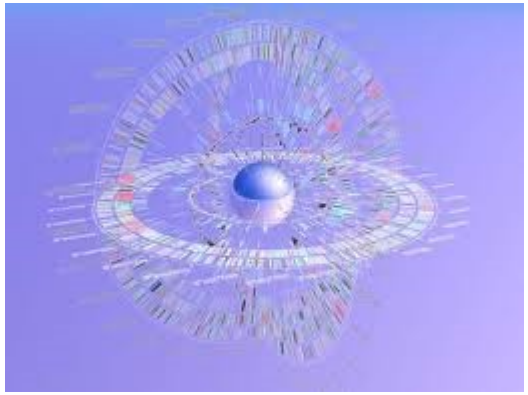


Chance, Necessity or Design?

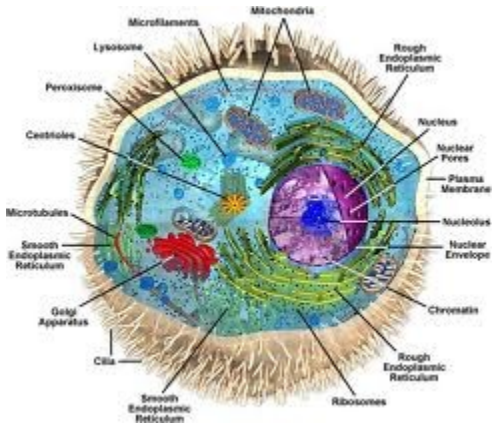
Scratches on cave wall

Human genome

3B Base Pairs



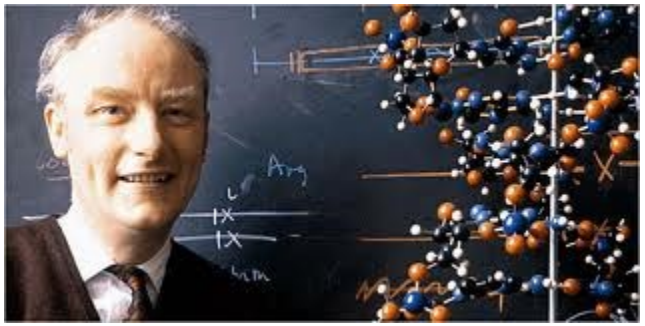
75T Cells



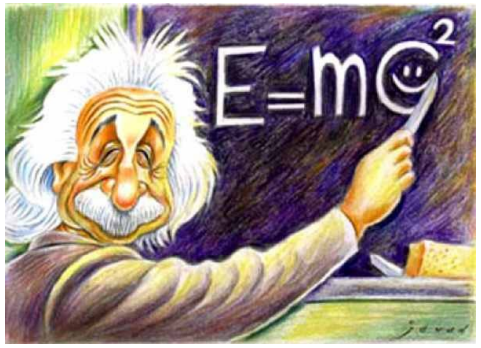
The Evolutionists' Response?

- "Even if all the data point to an intelligent designer, such a hypothesis is excluded from science because it is not naturalistic."
  - **S.C. Todd**, Kansas State University Professor
- "Biology is the study of complicated things that have the appearance of having been designed for a purpose."
  - **Richard Dawkins**, Oxford Univ. Atheist Biologist

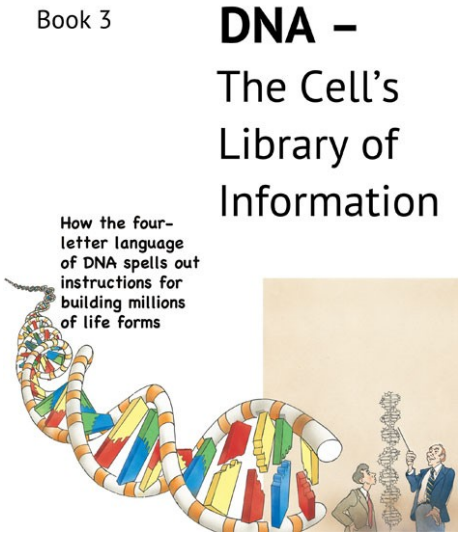
- "Biologists must constantly keep in mind that what they see was not designed, but rather evolved."
  - **Francis Crick**, Co-discoverer of DNA



3. Presuppositions & Information



- Evolution presupposition
  - The universe consists of only two ***material*** entities – **<u>mass</u>** and **<u>energy</u>**
- Creation presupposition
  - A 3rd ***non-material*** entity – **<u>information</u>**
- Life consists of:
  - **<u>Mass</u>** + **<u>energy</u>** (***material***) + **<u>information</u>** (***non-material***)
  - Information is encoded in the DNA of all plant and animal cells
- **<u>Information</u>** has four parts:
  - <u>Code</u>, <u>meaning</u>, <u>action</u>, <u>purpose</u>

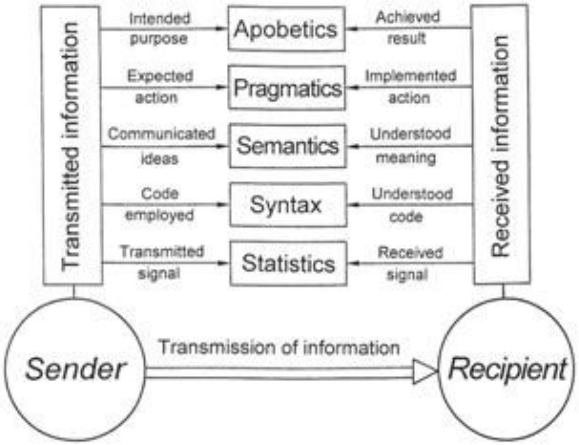


4. The Nature of Information

A 0065 A	B 0066 B	C 0067 C	D 0068 D	E 0069 E	F 0070 F	G 0071 G
H 0072 H	I 0073 I	J 0074 J	K 0075 K	L 0076 L	M 0077 M	N 0078 N
O 0079 O	P 0080 P	Q 0081 Q	R 0082 R	S 0083 S	T 0084 T	U 0085 U
V 0086 V	W 0087 W	X 0088 X	Y 0089 Y	Z 0090 Z		

Information Definitions

- Information attributes:
  - **Code** (syntax): alphabet, DNA (ATCG)
  - **Meaning** (semantics): words, codons
  - Expected **Action** (pragmatics)
  - Intended **Purpose** (apobetics): design, result
- All structural attributes are non-material
- **Information** is an **encoded**, symbolically represented **message** conveying expected **action** and intended **purpose**.

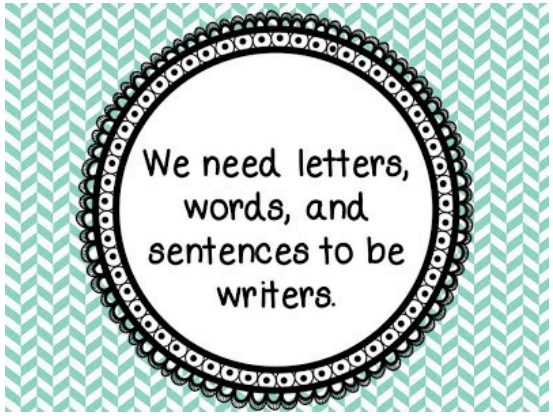


Information in Writing

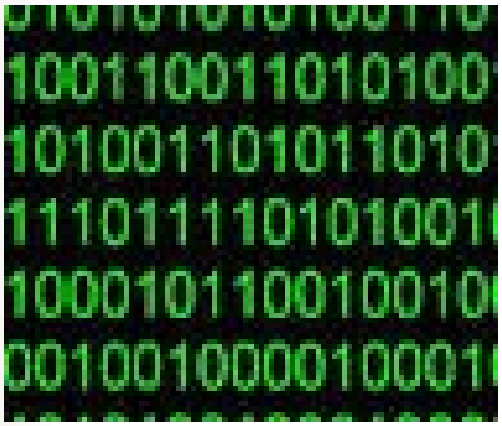
- Information requires:
  - **Code**: letters, numbers, etc.
  - **Meaning**: words
  - **Action**: sentence with verb
  - **Purpose**: result, design
- Complex but unspecified

  neojct oheeoh otvp ct mo muj
- **Specified Complexity**

  the cow jumped over the moon



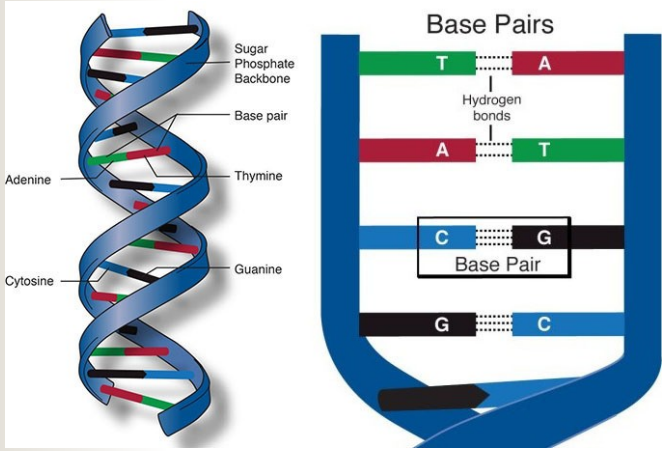
Information in Computers

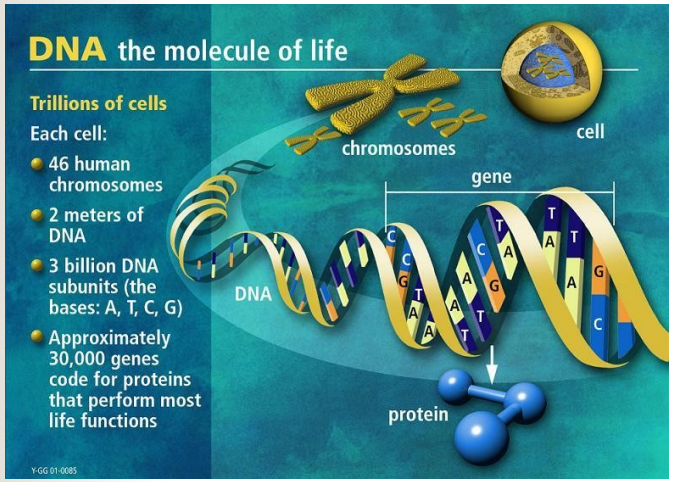


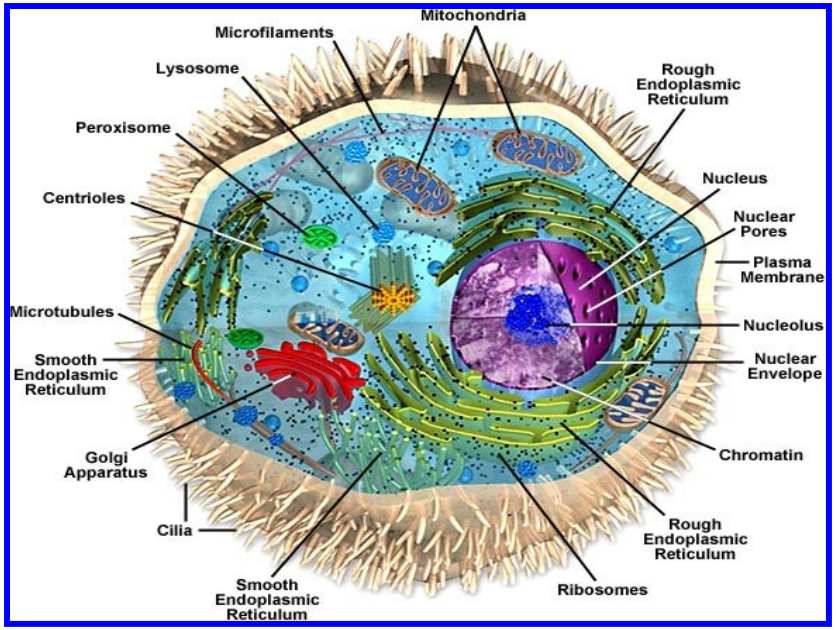
Example of Pseudocode to determine odd-even number

```
BEGIN

  Number = Input Number
  Result = Number % 2

  IF Result = 0
    THEN Print "The number is even number"
  ELSE
    THEN Print "The number is odd number"
```

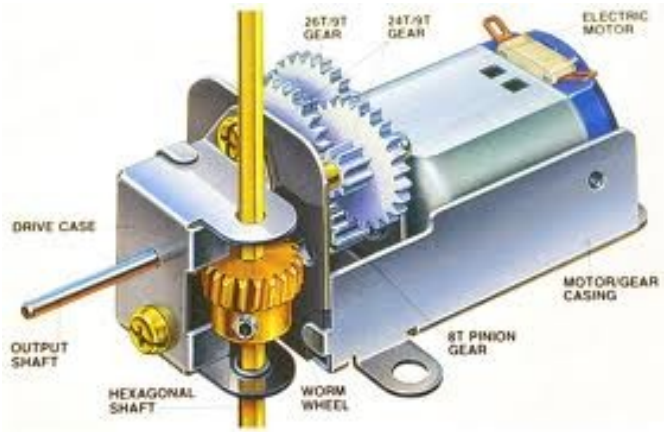
Information in Living Systems

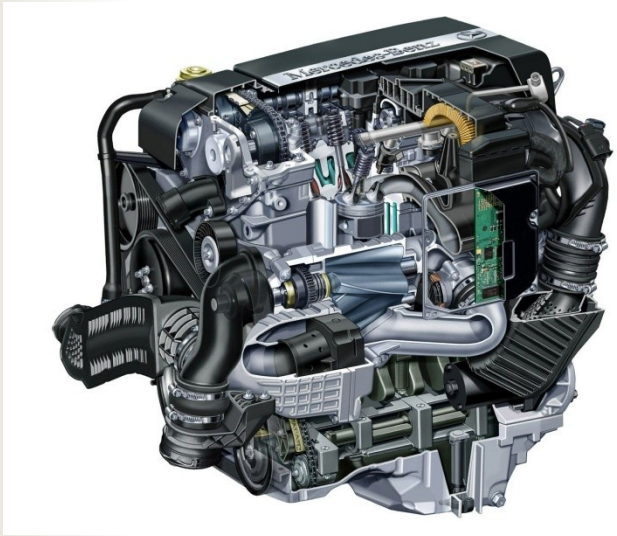


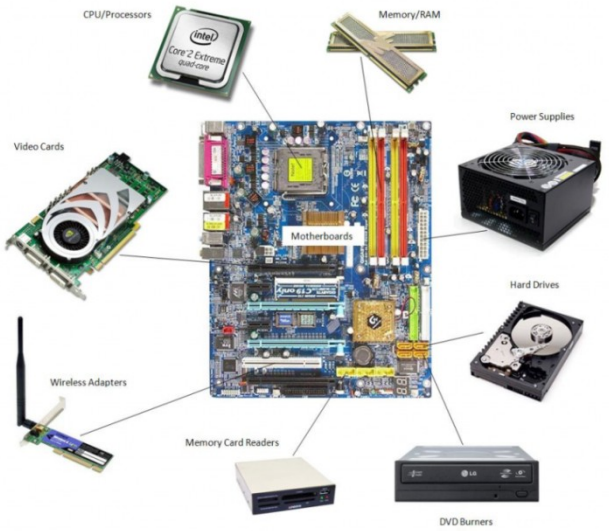




5. The Nature of Machines

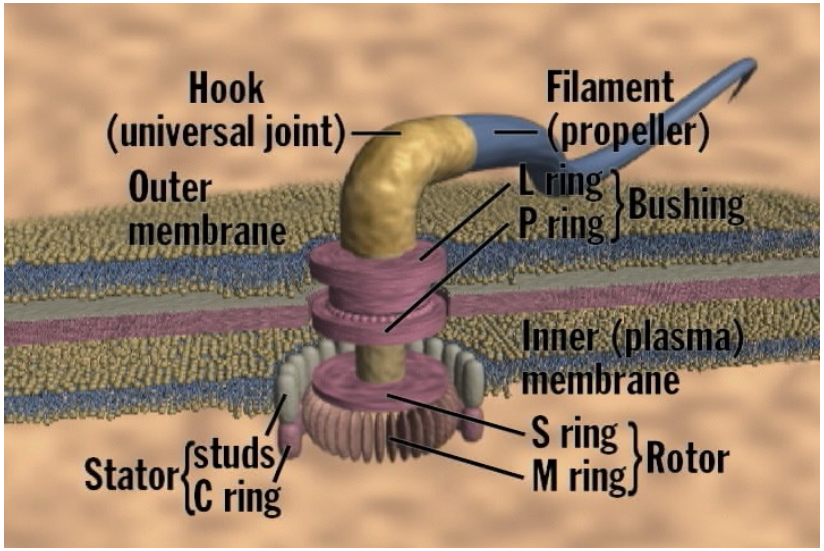


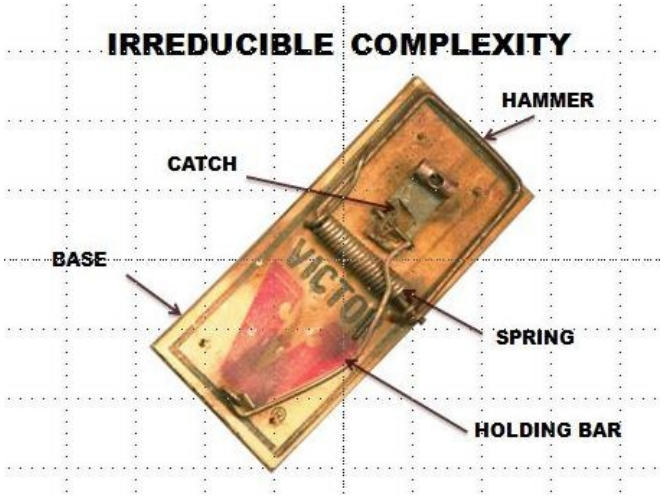




Molecular Machines, e.g. Motors

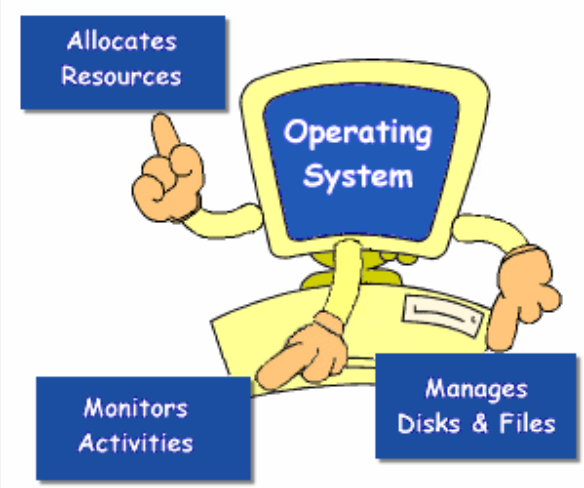
- Behe showed that the cell, Darwin's Black Box, is filled with **Irreducibly Complex** (**all parts functional**) molecular machines that could not be built by natural selection
- Over 100 molecular motors are now known to exist inside the cell with very specific analogies to human designed motors

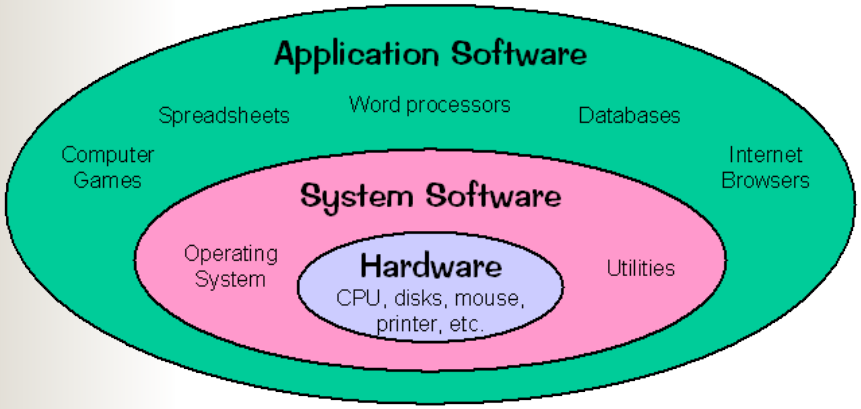




The Ribosome: a most sophisticated machine!

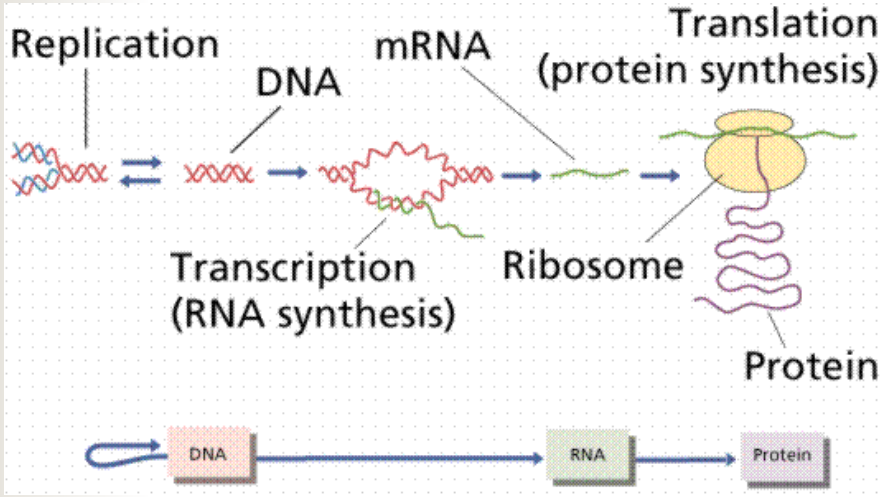
6. The Nature of Programs

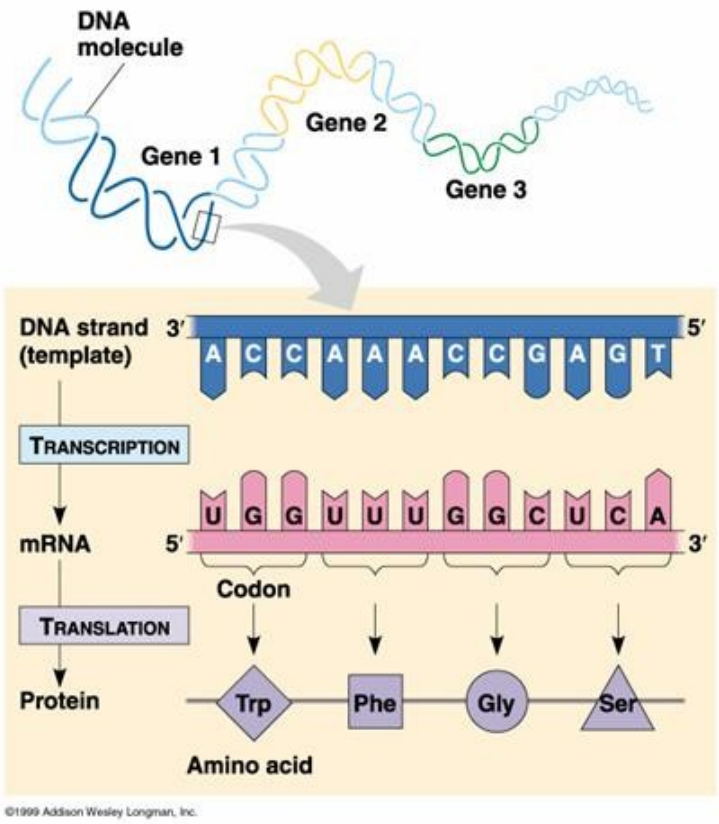





```java
/**
   @version 1.30 2000-03-27
   @author Cay Horstmann
*/

import java.util.*;

public class CalendarTest
{
   public static void main(String[] args)
   {
      // construct d as current date
      GregorianCalendar d = new GregorianCalendar();

      int today = d.get(Calendar.DAY_OF_MONTH);
      int month = d.get(Calendar.MONTH);

      // set d to start date of the month
      d.set(Calendar.DAY_OF_MONTH, 1);

      int weekday = d.get(Calendar.DAY_OF_WEEK);

      // print heading
      System.out.println("Sun Mon Tue Wed Thu Fri Sat");

      // indent first line of calendar
      for (int i = Calendar.SUNDAY; i < weekday; i++ )
         System.out.print("    ");

      do
      {
         // print day
         int day = d.get(Calendar.DAY_OF_MONTH);
         if (day < 10) System.out.print(" ");
         System.out.print(day);

         // mark current day with *
         if (day == today)
            System.out.print("* ");
         else
            System.out.print("  ");

         // start a new line after every Saturday
         if (weekday == Calendar.SATURDAY)
            System.out.println();

         // advance d to the next day
         d.add(Calendar.DAY_OF_MONTH, 1);
         weekday = d.get(Calendar.DAY_OF_WEEK);
      }
      while (d.get(Calendar.MONTH) == month);
      // the loop exits when d is day 1 of the next month

      // print final end of line if necessary
      if (weekday != Calendar.SUNDAY)
         System.out.println();
   }
}
```

Programs in the Cell



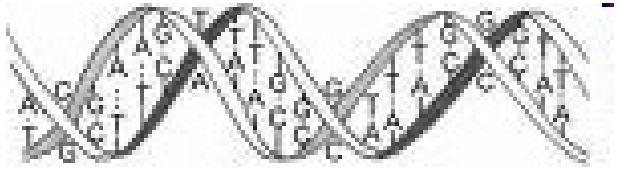


"Human DNA is like a computer program but far, far more advanced than any software we've ever created."

Bill Gates, Microsoft

7. Life: Information, Complexity, Design

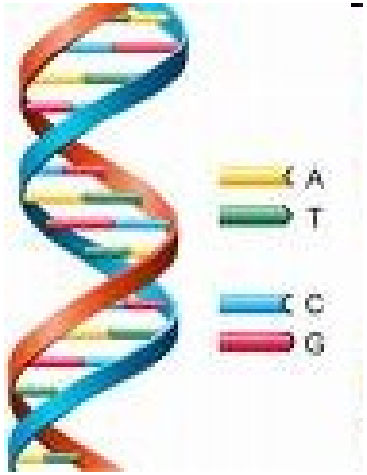
- **Information** in living systems
  - DNA: base pairs (AT, CG), codons, 20 left-handed amino acids

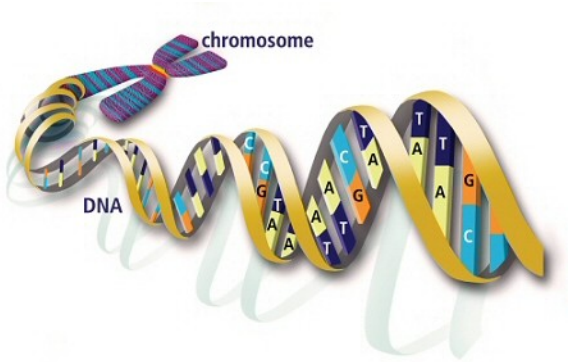


- Biological systems exhibit Specified Complexity and use Irreducibly Complex (all parts) subsystems
- Naturalistic mechanisms or undirected causes do not suffice to explain origin of **Complexity**
- Intelligent **Design** constitutes the best explanation for the origin of Specified Complexity and Irreducible Complexity in biological systems

More on Information in Life

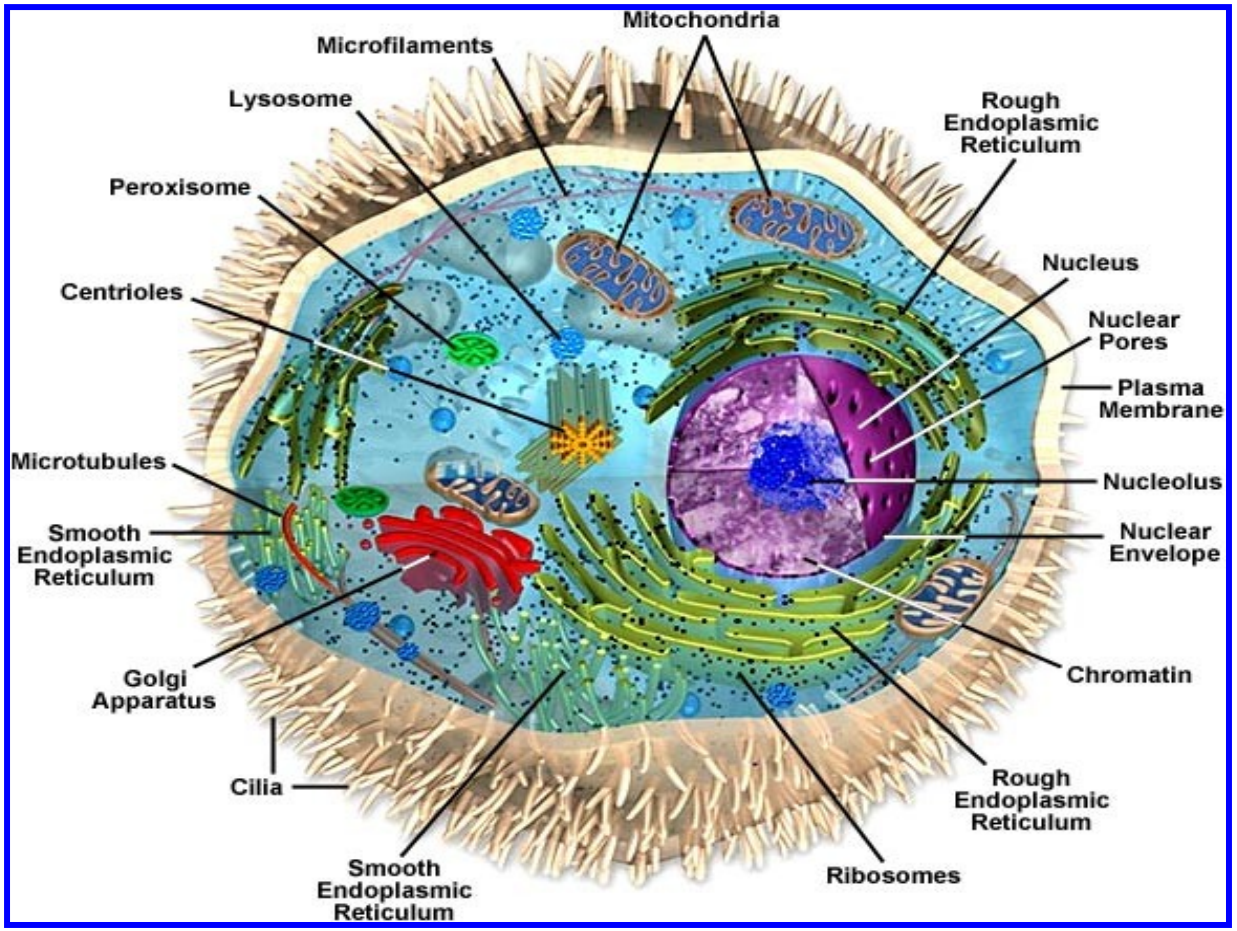
- Code: 4 letters – adenine (A), cytosine (C), guanine (G), thymine (T)
  - Words (**codons**) composed of 3 letters
- Meaning: each 3-letter word represents 1 of the 20 [left-handed] amino acids necessary for protein formation
  - Sequence of **codons** in the DNA represents sequence of amino acids in a protein
- Action: proteins needed for construction, function, maintenance, reproduction of the organism and its cellular components
- Purpose: reproduction of life



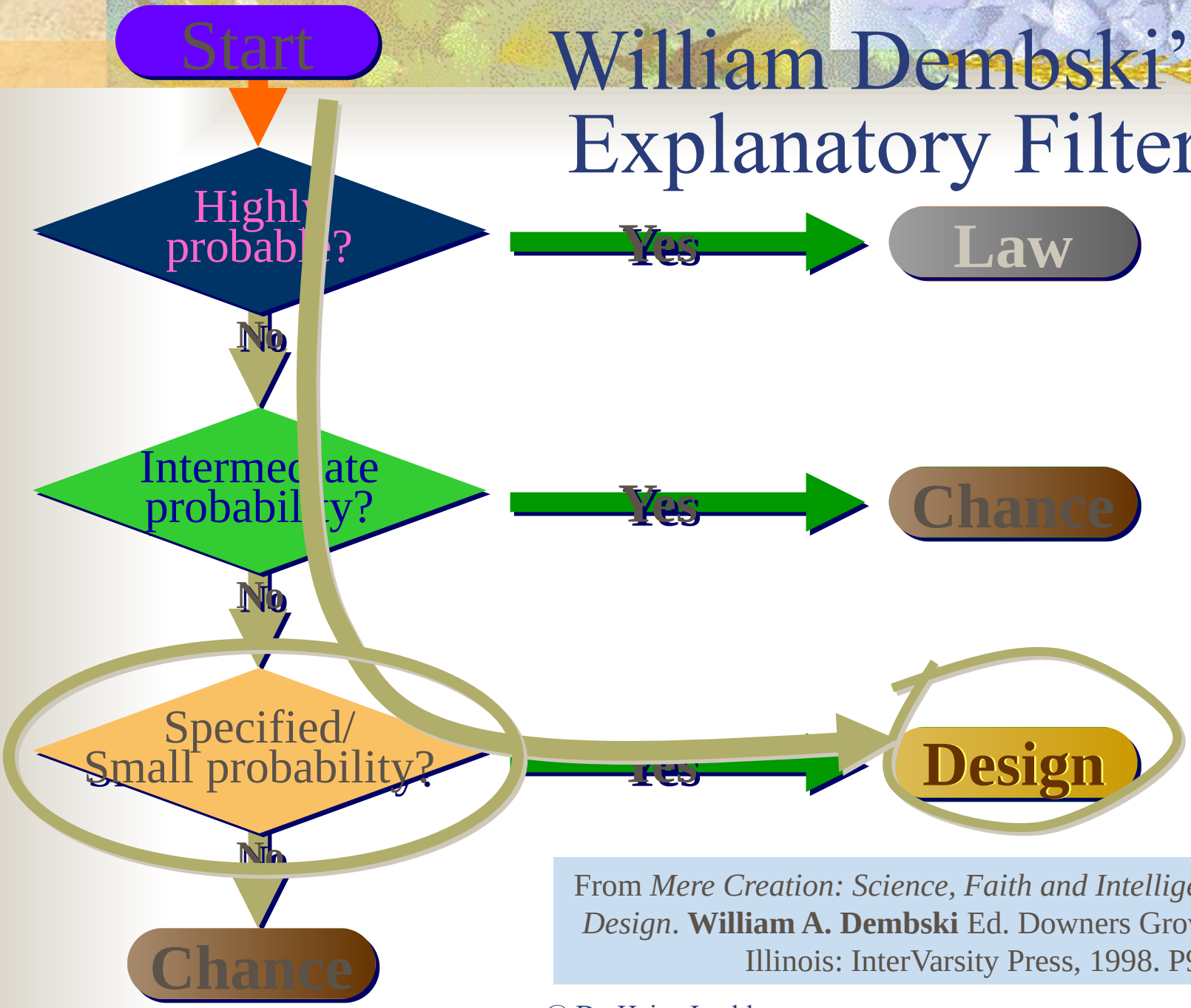


Complexity of the Cell

- Average human body contains 75+ trillion cells



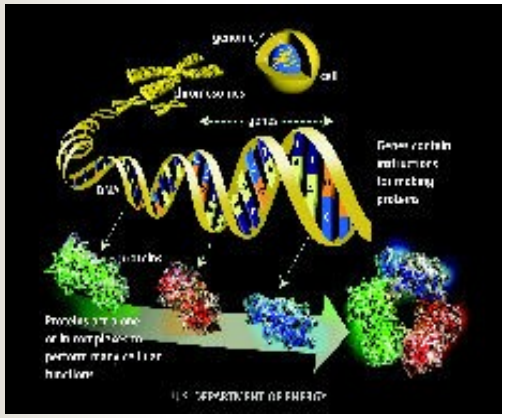
William Dembski's Explanatory Filter



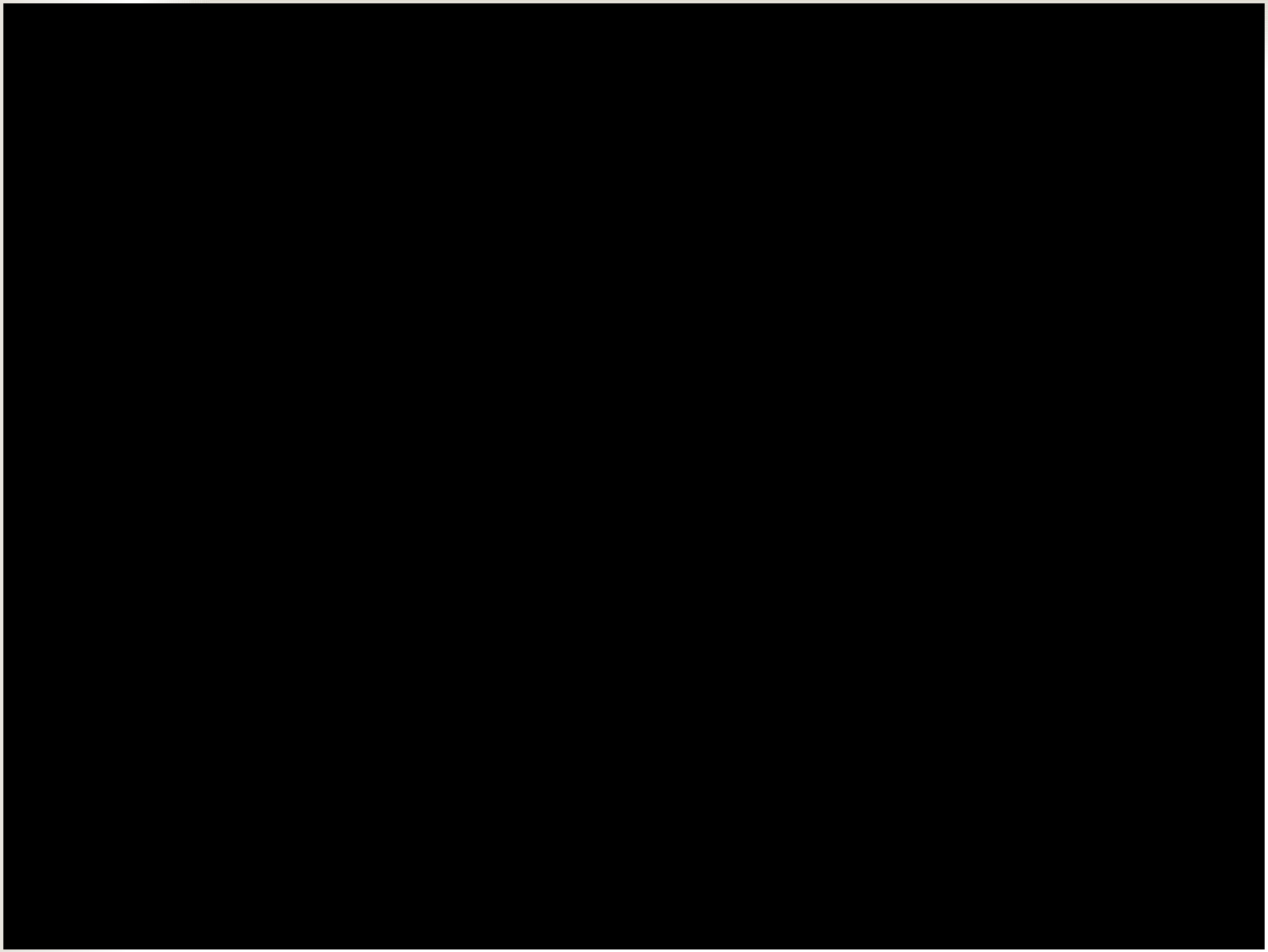
From *Mere Creation: Science, Faith and Intelligent Design*. **William A. Dembski** Ed. Downers Grove, Illinois: InterVarsity Press, 1998. P99.

Evidence for Design in Life

- **Biology**: the presence of complex and functionally integrated machines has cast doubt on Darwinian mechanisms of self-assembly
- **Molecular biology**: the presence of information encoded along the DNA molecule has suggested the activity of a prior designing intelligence



Harvard biologist **Richard Lewontin** urges scientists to embrace a "materialism [that] is absolute" and to stick with "material explanations, no matter how counter intuitive."



DNA Is Code – Who Coded It?

8. Mathematical Probability

- Chances of getting all heads in a row when flipping a coin?

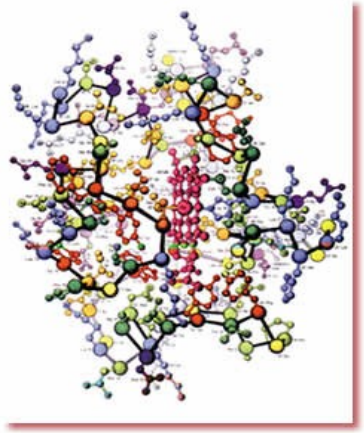
- 1 head
- 2 heads in a row
- 3 heads in a row
- 10 heads in a row
- 100 heads in a row
- 1000 heads in a

- 1 in 2 (½)
- 1 in 4 (½ * ½)
- 1 in 8 (½ * ½ * ½)
- 1 in 2^{10} (1024) or 10^3
- 1 in 2^{100} or 10^{30}

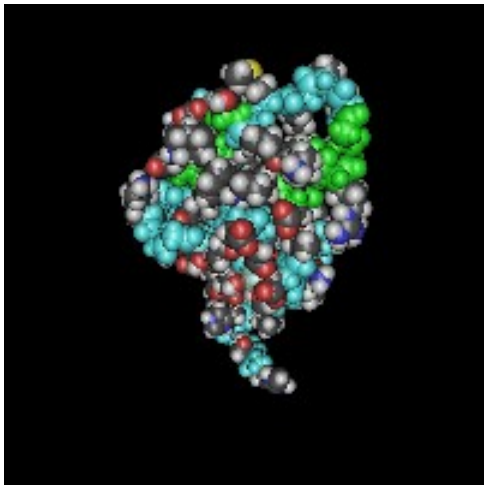
Law of Probability: < 1 in $\mathbf{10^{50}}$ is mathematically impossible

9. Life From Non-Life By Chance?

- What is the probability that an explosion in a junk yard would "create" a car?
- What is the probability of creating a Boeing airplane (5M non-flying parts) from such an explosion?
- What is the probability that 200 monkeys pawing away at a typewriter could "write" a Shakespearean play?
- What is the probability of a protein coming into being by chance?



Proteins and Amino Acids



- Amino acids
  - A few thousand types
  - Right- and left-handed
- Proteins - the building blocks of life
  - Large organic molecule
  - Contain 100's to a few 1000 amino acids
  - Specified long sequences of amino acids
  - Contain 20 different left-handed amino acids
- Crucial protein fact
  - Absence, addition, or replacement of a single amino acid in the structure of a protein causes protein to be useless

Probability of Forming one Protein

- Take 200 parts and line them up in a specific order
  - 200! ways of aligning these parts = 10^{375}
  - Try a new alignment 1 billion times a second
  - Assuming 20 billion years of time, we have $20 * 10^{18}$ seconds
  - The probability of finding the right alignment is practically zero, i.e. 1 in 10^{356}
  - Only 10^{80} atoms in the whole universe
  - Anything less than 1 in 10^{50} is regarded as **zero probability**
- Living organisms contain many more than 200 parts
- Human being contains 75+ trillion cells

How Simple Can Life Be?

- Smallest bacteria
  - 482 genes
  - 600 types of proteins
  - **580,000 DNA base pairs** (letters)
  - Probability of chance formation is zero!
- Human genome
  - 25,000 genes
  - 100,000+ types of proteins
  - **3,000,000,000 DNA base pairs**

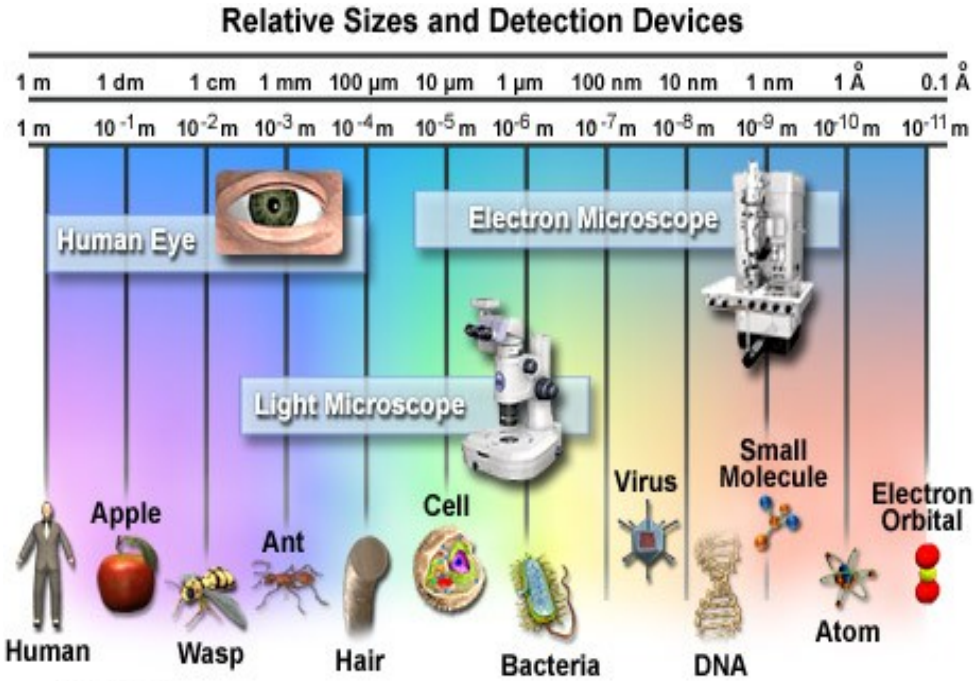
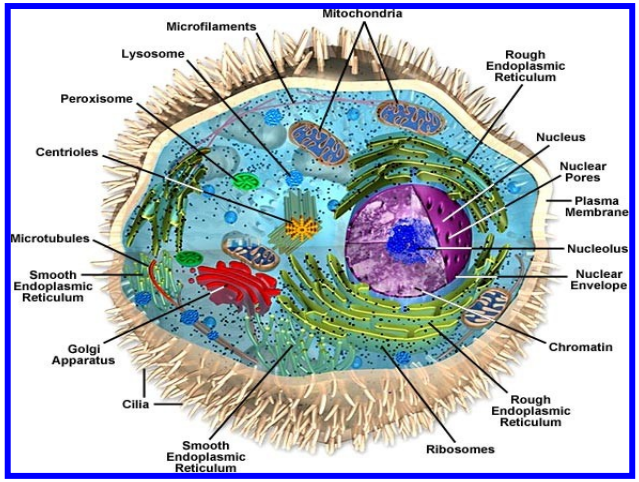
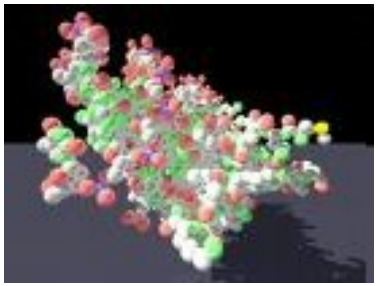


Figure 1

Probability & Life

- A single protein: 1 in 10^{240}
  - 400 amino acids
- A single cell: 1 in $10^{40,000}$
  - Spontaneous formation of life
- Atoms in the universe: 10^{80}
- Law of Probability: 1 in 10^{50}





Living Matter and Information

"It's a shame that there are precious few hard facts when it comes to the origin of life. We have a rough idea when it began on Earth, and some interesting theories about where, but the how part has everybody stumped. **Nobody knows how a mixture of lifeless chemicals spontaneously organized themselves into the first living cell**."

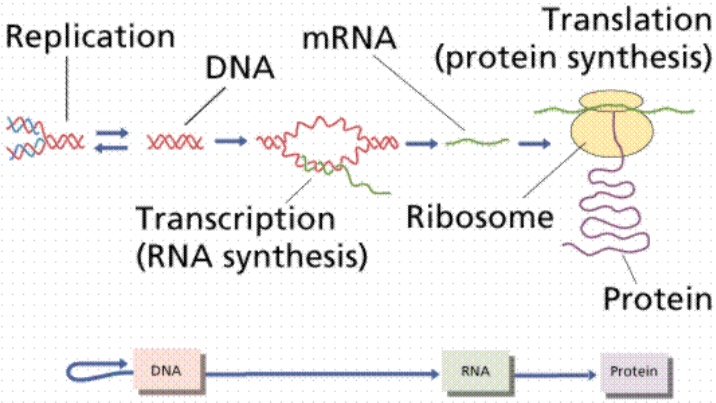
- **Paul Davies**, *Australian astrobiologist* [Evolutionist]

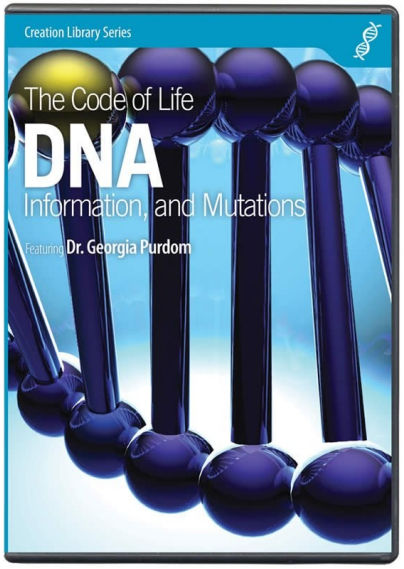
"**There is no known law of nature, no known process and no known sequence of events which can cause information to originate by itself in matter**."

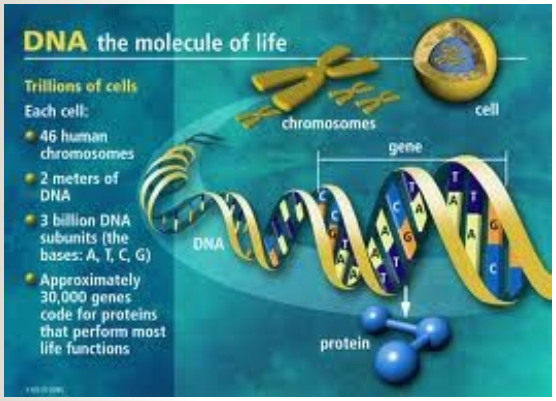
- **Werner Gitt**, *German information scientist* [Creationist]

10. In Conclusion

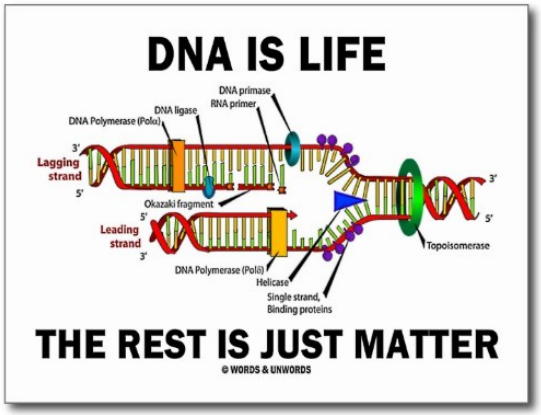
- Life = **mass** + **energy** (*material*) + **information** (*non-material*)
- Life requires:
  - **Information** stored in DNA
  - **Machines** (storage + programming)
  - **Programs** , e.g. replication
  - **Complexity**: Irreducible (all parts) & Specified (meaning)
  - **Design** ---> a Designer
- Life from non-life? **NOT** by chance**!**
  - Information **IS** the basis for life
  - Information requires an Intelligent Mind







Thank you for your attention!



Information IS The Basis For Life!

Information Requires an Intelligent Mind

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