DISCUSSION 2

WHERE DID LIFE COME FROM?

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WHERE DID LIFE COME FROM?

OUTLINE

1. The problem
2. What is life?
3. The complexity of life
4. The battle over spontaneous generation
5. Chemical evolution
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7. A shocking incident
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1. THE PROBLEM

1. THE PROBLEM

The Bible is very clear about the origin of life. God created the various kinds of organisms. Excerpts from the first chapter of the Bible state:

"Then God said, Let the earth bring forth grass, … the fruit tree that yields fruit … and it was so.

"So God created great whales, … and every winged fowl after its kind: and God saw that it was good.

"And God made the beasts of the earth after his kind, cattle after their kind, and everything that creepeth upon the earth … and God saw that it was good.

"So God created man in His own image, in the image of God created he him; male and female created he them. And God blessed them, …"

1. THE PROBLEM

Where did life come from? Some say God created it, others say it came as a result of a long evolutionary process all by itself.

The term evolution in its broadest meaning is a philosophical concept that can encompass many things such as the evolution of the universe or the evolution of a civilization, etc.

Commonly we think of evolution as representing the gradual evolution of living things. This includes their origin from nonliving matter and their development into very complex advanced organisms.

In this discussion we shall address specifically the question of how life could have evolved from nonliving matter by itself. This is likely the most important question evolution has to address. It is also the most difficult problem that biological evolution faces.

1. THE PROBLEM

One of the world's most popular journals, National Geographic (November 2004), that strongly promotes evolution, had a surprising question on the cover:

"WAS DARWIN WRONG?"

On the other hand, on the inside, the article discussing this intriguing question left no room for doubt. The answer was:

"NO. THE EVIDENCE FOR EVOLUTION IS OVERWHELMING."

However, most of the scientific evidence presented for evolution in the article was surprisingly poor. It spoke mostly about very small changes in organisms (microevolution), assuming they then evolved from each other. This was also Darwin's emphasis. It skipped evolution's most difficult problem, namely, how could life originate all by itself as evolution proposes?

1. THE PROBLEM

ONE READER'S RESPONSE in a later issue of the journal reflects the dilemma many have with evolution:

"I am not surprised that nearly half of all Americans believe 'God alone, and not evolution, produced humans.' When I look at my three beautiful children, it is hard to believe they are the end result of evolving Eocene pond scum.

"My father-in-law, on the other hand, may be the evidence you've been looking for."

Toby Pitts
Baltimore, Maryland

1. THE PROBLEM

Many scientists believe that life arose spontaneously, and some have devoted their life-long research trying to figure out how it could have happened all by itself on a barren earth. There is lots of speculation, but very few significant suggestions.

Other scientists are more cautious about this enigma. The biochemist Franklin M. Harold in his book *The Way of the Cell* (p 251) states: "The origin of life appears to me as incomprehensible as ever, a matter for wonder but not for explication."

2. WHAT IS LIFE?

2. WHAT IS LIFE?

Life has unique characteristics, such as cells, growth, the chemical changes of metabolism and the reproduction of new organisms. We don't usually have trouble identifying it.

We are used to being able to tell if an organisms is dead or alive. The following picture illustrates our common understanding of what life is all about. Rocks and ice are dead, while plants that grow and have flowers that help in the reproductive process, are without question alive.

The view of the famed Matterhorn in Switzerland (next slide) illustrates this. In this case we have no problem telling what is alive from what is dead.

Flowers and trees near the base of the icy and rocky Matterhorn peak in Switzerland

2. WHAT IS LIFE?

There is no question that the shark that I photographed in the next picture is alive. Of course, when it came by and seemed interested in me I had other questions and concerns! However, fish easily illustrate the problem of what is alive, especially if you have a dying fish, because the processes that lead to death are complicated and often gradual.

Conversely, can life arise gradually? This is an important question, and many people think it has. It needs to be kept in mind that the simplest form of independent life that we can imagine is so complicated and requires so many different parts and complex systems that have to be working, that a gradual evolution for the first form of life does not seem possible.

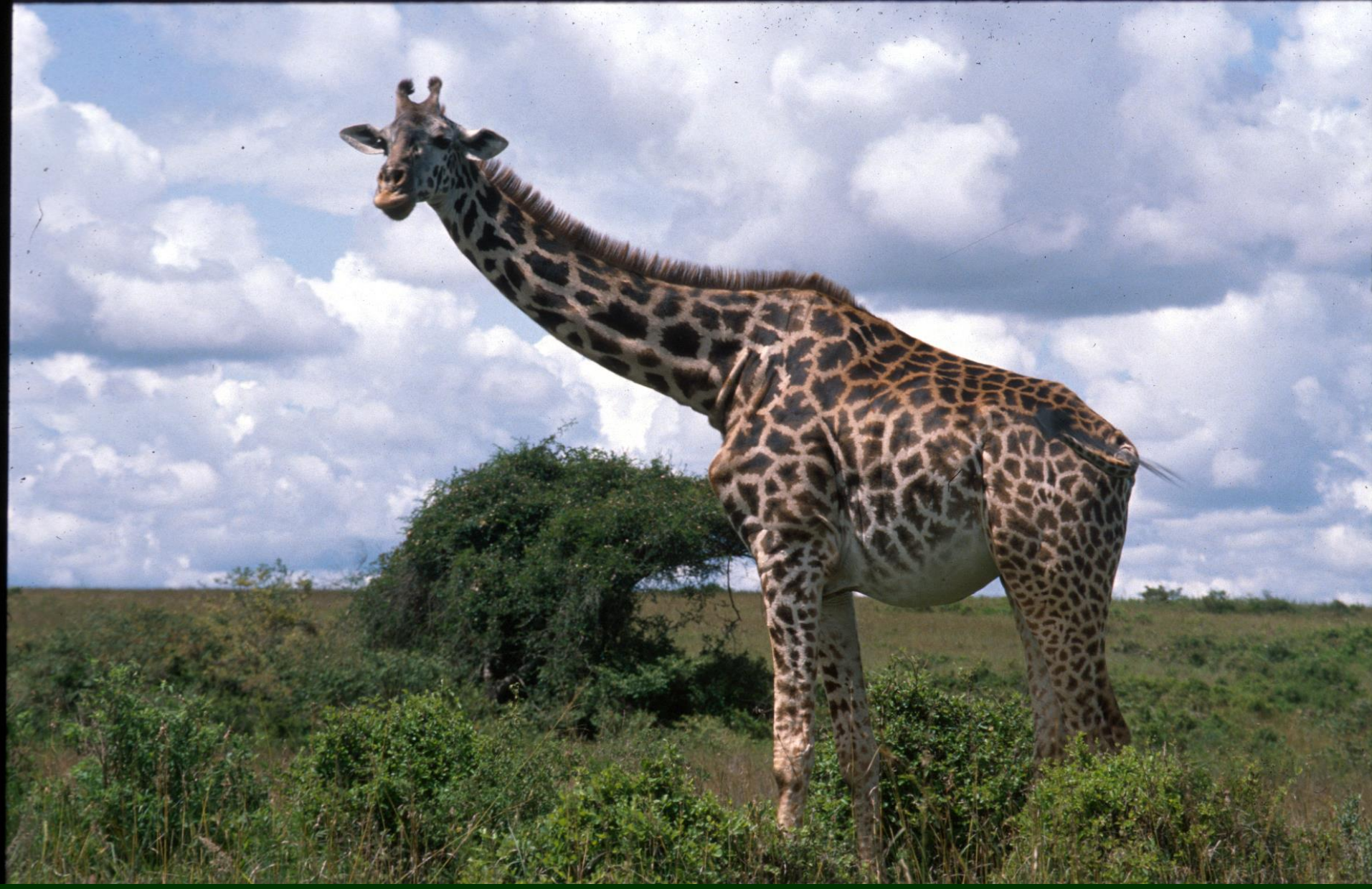
In this discussion about the origin of life, we are especially interested in questions related to the origin of the first form of life on earth, as proposed by evolution.

Gray shark, Enewetak Atoll, Marshall Islands

2. WHAT IS LIFE?

Some suggest that since you can break up a large crystal, like salt, into many smaller similar salt crystals, this illustrates that nonliving things can also reproduce. However the chemical structure of salt is so extremely simple, compared to that of living things, that the comparison is hardly interesting. Living things carry out many hundreds of different complicated chemical changes when alive.

One of the cardinal characteristics of life is the ability to reproduce more similar individuals. The very pregnant giraffe from Kenya in the next slide illustrates this. There is a small developing giraffe in her abdomen! Reproduction of any form of life requires very complicated processes.



Pregnant giraffe, near Nairobi, Kenya

2. WHAT IS LIFE?

When it comes to the controversy between evolution and creation, the issue of what is life becomes much more significant when we look at viruses. Viruses show a little complexity and since they are associated with living things, one can suggest that they represent some of the first simple forms of evolving life. However, there are serious problems with that suggestion.

Viruses are very small, they usually consist of two parts. On the inside is some DNA or RNA (i.e. nucleic acids), and on the outside is a shell of protein molecules. Their geometric structure is so constant that some have been aggregated into larger crystals. The DNA or RNA can serve as the template formula for 4 to as many as 200 different kinds of proteins.

2. WHAT IS LIFE?

When a virus is inside a living cell, it stimulates the complex replicating systems of that cell to produce more viruses, and during late stages of infection, it can commandeer those systems to produce very large numbers of viruses. Furthermore, genes (DNA) carried by viruses can be inserted into the DNA of a normal cell and sometimes turn it into a cancer cell.

2. WHAT IS LIFE?

It needs to be kept in mind that viruses of themselves are not alive, they cannot reproduce themselves; they are only reproduced by the complex reproductive systems of the living cells they invade. As such, they do not represent a valid intermediate on the way to evolving life. Viruses depend on living cells, so the living cell must have existed before the virus. Our simplest forms of independent life are much more versatile and much more complex than viruses.

Recall that life is defined as including: cells, growth, metabolism, and reproduction. It takes lots of complicated parts to have and do all that. Viruses do not have these qualities.

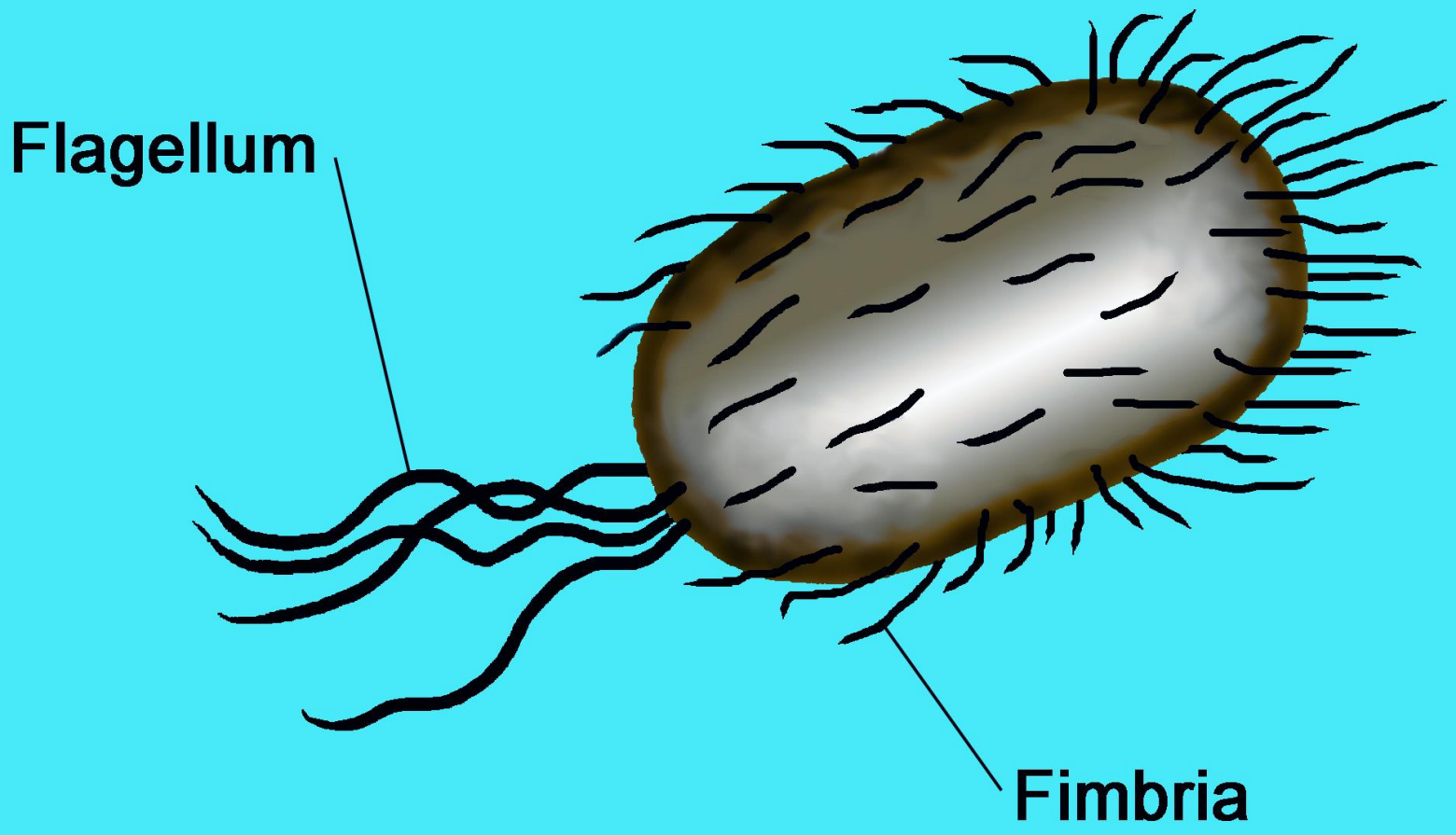
3. THE COMPLEXITY OF LIFE

3. THE COMPLEXITY OF LIFE

One of the simplest and best studied organisms is the tiny microbe *Escherichia coli*. It is a single cell, found in the digestive tract of animals and in soil. It is a tiny rod-shaped organism that is so small that it would take 500 of them placed end to end to equal one millimeter (12,500 for an inch).

On the outside of the microbe are several long spiral whip-like flagella that have a complex motor at their base that rotates the flagella for locomotion. About two thirds of the inside of the microbe consists of some 40,000,000,000 molecules of water. The rest of the organism is of staggering chemical complexity. The next slide illustrates the microbe.

The microbe *Escherichia coli*



3. THE COMPLEXITY OF LIFE

By complexity we refer to parts that are dependent on each other in order to function properly. It is somewhat like the gears of a watch that are dependent on each other for proper function. This is in contrast to independent parts like rocks lying in a pile that are not dependent on each other.

The next slide lists various types of components or molecules found in a single *Escherichia coli* microbe, the total number of these types of molecules found, and the number of different kinds of molecules found within each type of molecule. There are several hundred million special molecules just in one single cell.

COMPOSITION OF A SINGLE *Escherichia coli* CELL

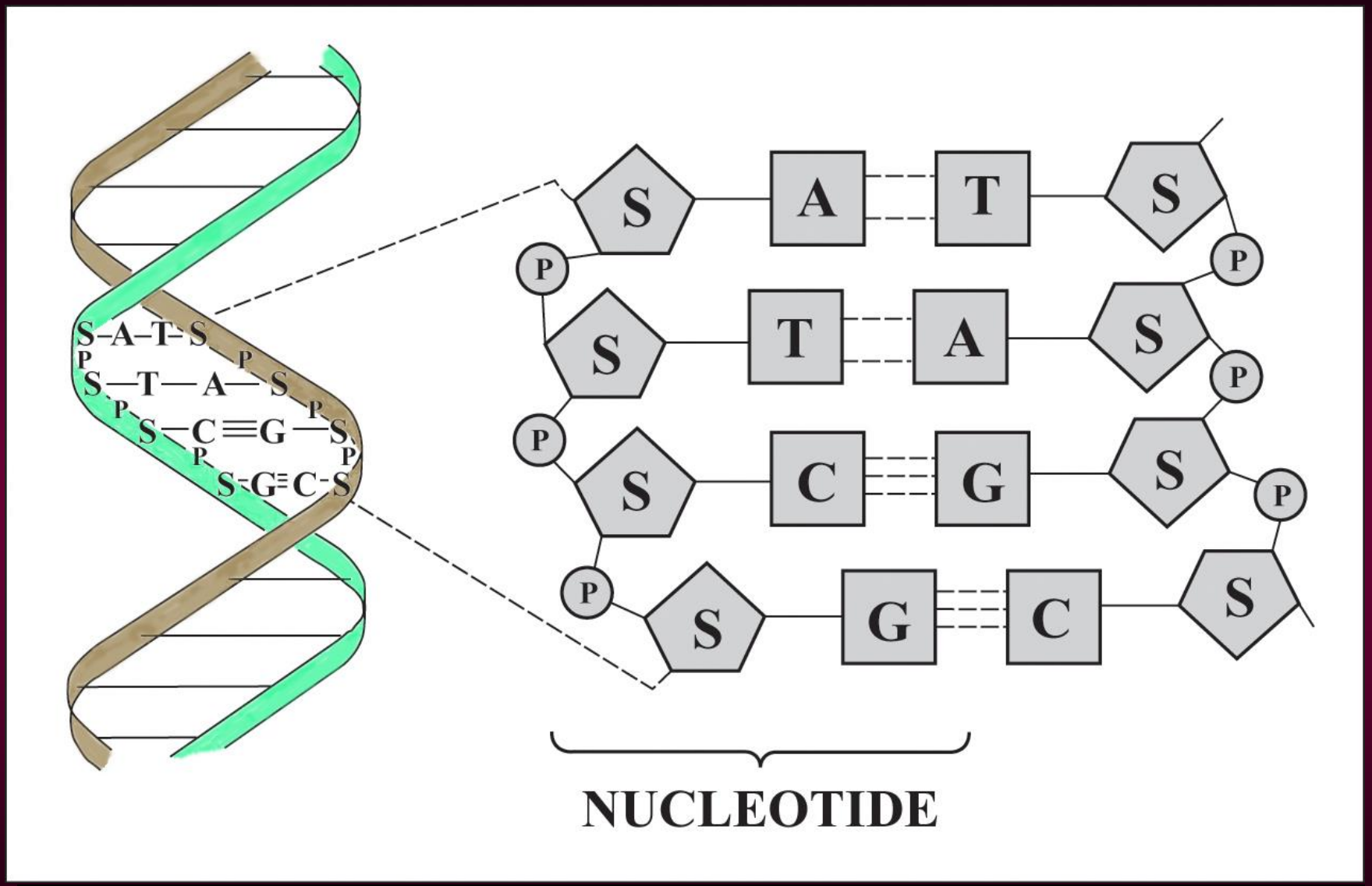
COMPONENT	NUMBER OF MOLECULES	KINDS OF MOLECULES
Protein	2,400,000	4288
Ribosomes	(20,000)	(1)
DNA	2	1
RNA	255,480	663
Polysaccharides	1,400,000	3
Lipids	22,000,000	50
Small metabolites	280,000,000	800
Water	40,000,000,000	1

3. THE COMPLEXITY OF LIFE

DNA (*deoxyribonucleic acid*) is the information molecule that directs many cell activities. In *Escherichia coli* the DNA has the code for over four thousand different kinds of protein molecules. In microbes like *E. coli,* the DNA consists of a fine threadlike loop that is scrunched up because it is eight hundred times longer than the microbe itself.

DNA is a very long complex molecule that consists of basic units called nucleotides. Each nucleotide consists of the combination of a sugar, a phosphate, and a base. The different bases code the DNA information. The four different kinds of bases on DNA are organic molecules designated as A, T, G, and C. RNA (*ribonucleic acid*), that serves in the transport of information, is slightly different from DNA and has mostly similar bases designated as A, U, G, and C. The DNA of *Escherichia coli* has 4,639,221 bases.

The DNA molecule is built somewhat like a very long twisted ladder. A very small portion is illustrated in the left of the next slide, with details on the right.



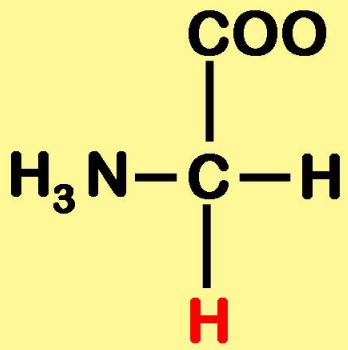
DNA double coil at the left. Details at the right. T,A,C,G, are the bases of the genetic code, P and S are the phosphate and sugar parts of the DNA.

3. THE COMPLEXITY OF LIFE

Proteins are also complicated molecules that perform many different kinds of functions in a cell, varying from stimulating a great variety of different chemical changes according to specific needs, to providing many of the structural parts of a cell.

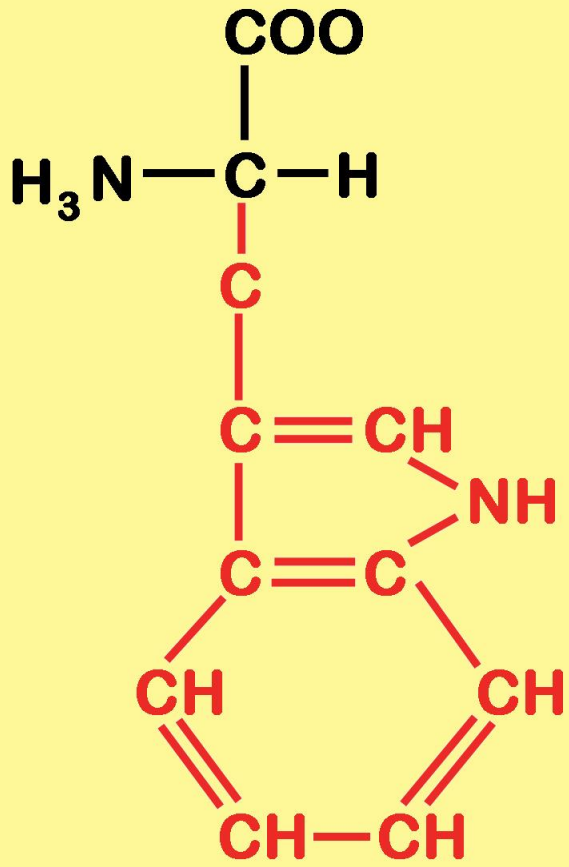
Proteins are built of dozens to hundreds of simpler organic molecules called *amino acids*. There are 20 different kinds of amino acids in living organisms. The chemical structure of two of these are illustrated in the next slide.

STRUCTURE OF TWO AMINO ACIDS



Glycine

The simplest of amino acids



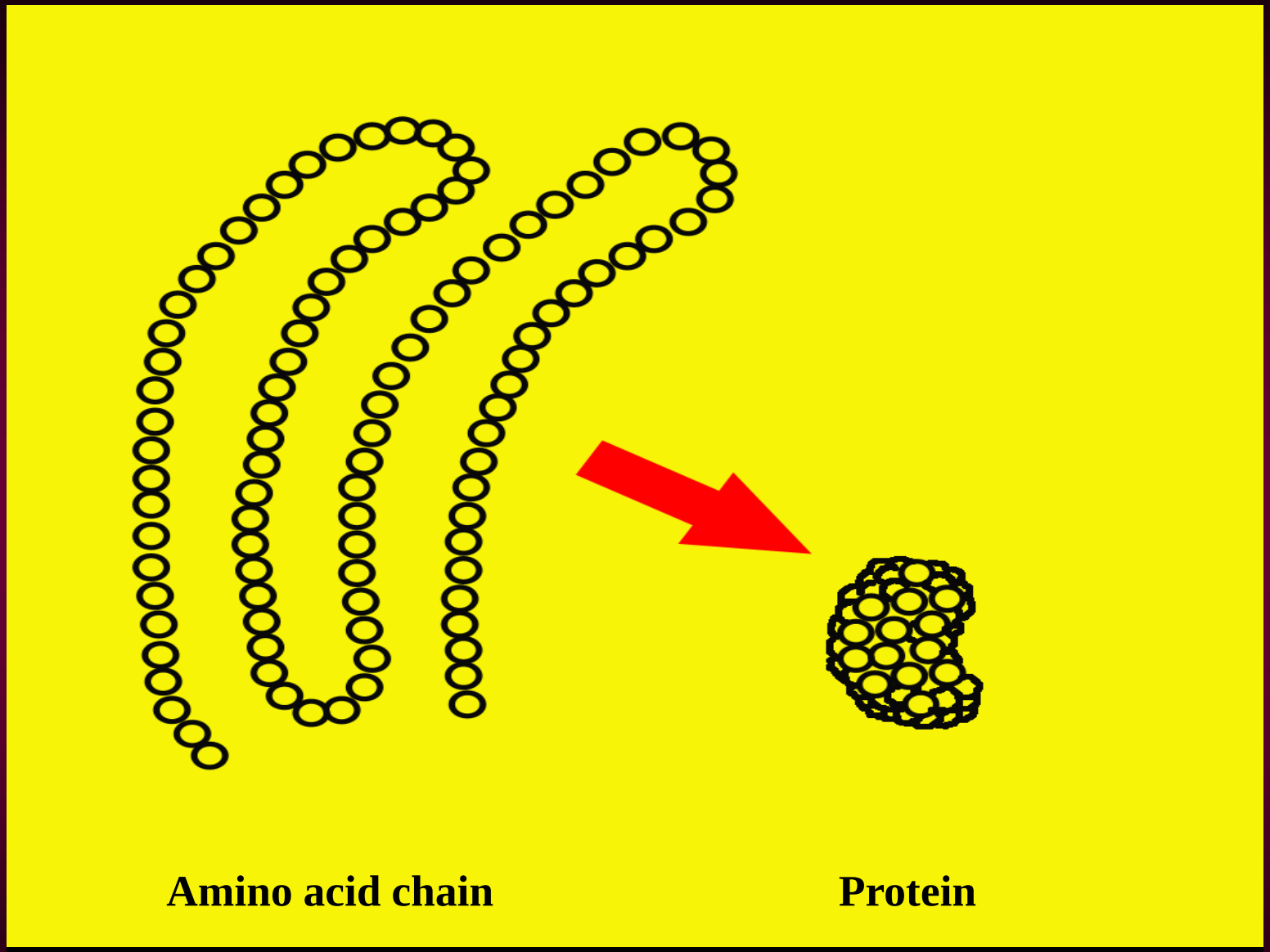
Tryptophan

The black part is the constant part, while the red part varies with each kind of amino acid.

3. THE COMPLEXITY OF LIFE

The final shape of a protein molecule is determined by the position of the various kinds of amino acids that are attached to each other, somewhat like the links on a chain. The shape of a protein is extremely important to its function, and only minor variations in the amino acid order are allowed if the protein is going to work properly.

In forming a protein, the long chain of amino acids is folded many times, commonly helped by special large protein molecules called chaperones. The folding of an amino acid chain is illustrated in the next slide.



The folding of an amino acid chain to form a protein molecule. Each circle represents a separate amino acid.

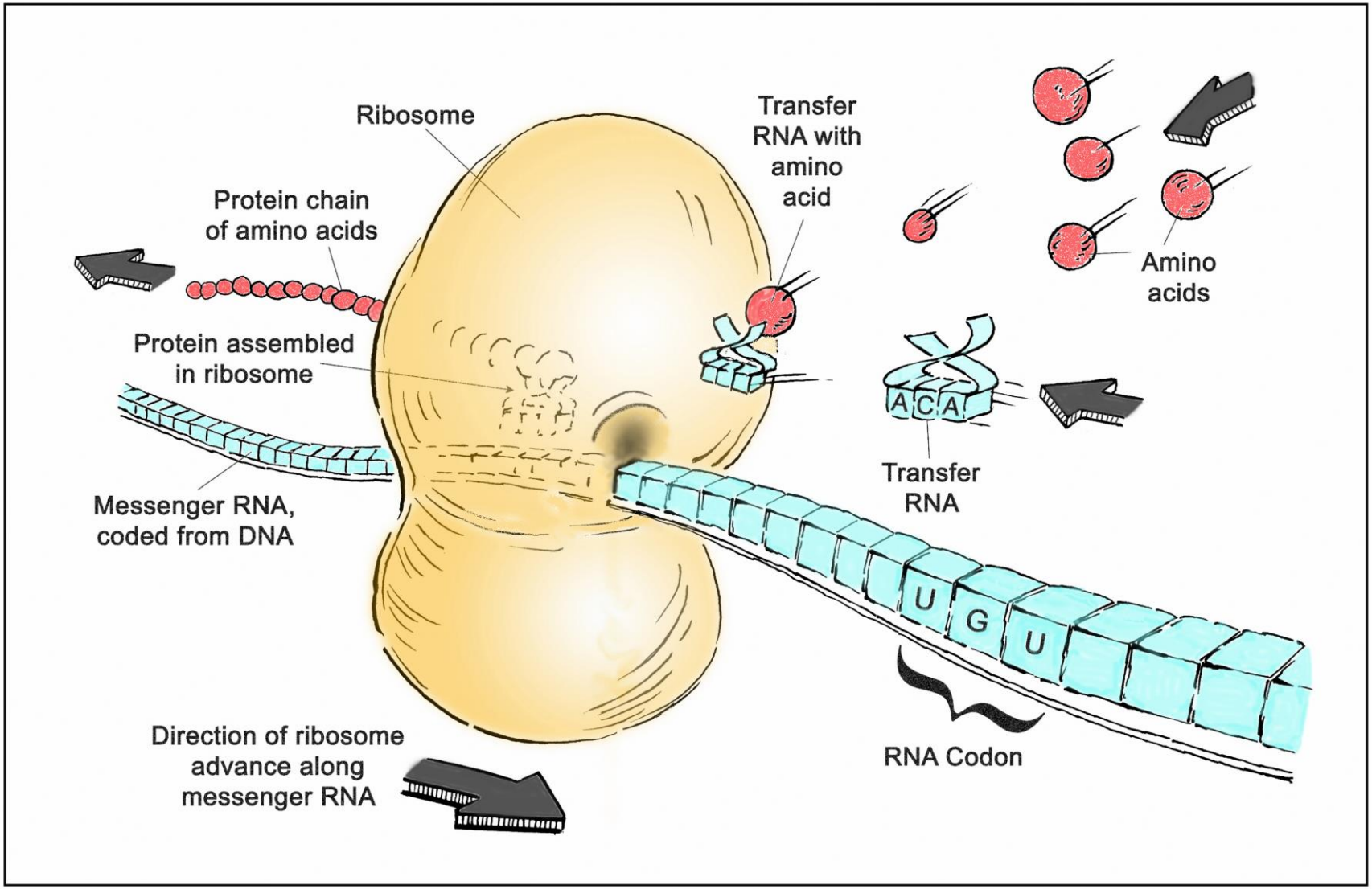
3. THE COMPLEXITY OF LIFE

When a cell needs a particular protein, a portion of the appropriate DNA is copied to *messenger RNA* molecules. These in turn are read by *transfer RNA* molecules, that in combination with a special molecule (*aminoacyl-tRNA synthetase*) that is specific for each kind of amino acid, places the correct amino acid where it is needed in the protein that is being assembled. See the next slide for an illustration of the process.

This assembly process occurs in highly specialized structures called *ribosomes*. There amino acids are added at the rate of three to five per second. Ribosomes themselves are complex, formed of some fifty different protein molecules and lots of RNA. One *Escherichia coli* organism can harbor some twenty thousand ribosomes.

In the next slide, the ribosome moves to the right as the code on the messenger RNA (blue chain) is matched by the code on the transfer RNA (three blue blocks) with the proper amino acid (red dots) for that code. The amino acids are joined together in the right order inside the ribosome and come out as the red chain illustrated on the left.

RIBOSOME



Based on Figure 4.6 in Harold, FM, 2001. The Way of the Cell.

3. COMPLEXITY OF LIFE

Computers work using only two kinds of basic symbols (bases); by contrast, living organisms use four kinds of bases. Furthermore, recent research indicates that the mechanism of the cell is much more complicated than the DNA and protein systems. RNA plays a crucial role in many activities and we have much to learn about how it works.

How is the proper amino acid selected in making a protein molecule? This is done through the all important genetic code that designates the kind of amino acid to be added as a protein molecule is assembled.

It takes three bases to code for one amino acid. For instance in RNA, the sequence GAU codes for the amino acid called aspartate, and CGC codes for the amino acid arginine.

The triplet of bases coding for an amino acid is called a *codon*. Several different codons can formulate for the same amino acid and all of the 64 possible codon combinations of living things are utilized.

The table on the next slide gives the codons for the 20 different kinds of amino acids of living things, as well as stop and start messages.

THE GENETIC CODE

FIRST LETTER	SECOND LETTER U	SECOND LETTER C	SECOND LETTER A	SECOND LETTER G	THIRD LETTER
U	Phenylalanine	Serine	Tyrosine	Cysteine	U
	Phenylalanine	Serine	Tyrosine	Cysteine	C
	Leucine	Serine	Stop	Stop	A
	Leucine	Serine	Stop	Tryptophan	G
C	Leucine	Proline	Histidine	Arginine	U
	Leucine	Proline	Histidine	Arginine	C
	Leucine	Proline	Glutamine	Arginine	A
	Leucine	Proline	Glutamine	Arginine	G
A	Isoleucine	Threonine	Asparagine	Serine	U
	Isoleucine	Threonine	Asparagine	Serine	C
	Isoleucine	Threonine	Lysine	Arginine	A
	Start, methionine	Threonine	Lysine	Arginine	G
G	Valine	Alanine	Aspartate	Glycine	U
	Valine	Alanine	Aspartate	Glycine	C
	Valine	Alanine	Glutamate	Glycine	A
	Valine	Alanine	Glutamate	Glycine	G

To find the code (codon) of an amino acid, look up its name in the table and follow the respective columns and rows for the first, second and third letters. For instance, the codes for glutamine are CAA and CAG.

4. THE BATTLE OVER SPONTANEOUS GENERATION

4. THE BATTLE OVER SPONTANEOUS GENERATION

The pioneer chemist van Helmont (1579-1644) provided a formula for making mice: Hide dirty rags with some grain and cheese, and soon you will find mice there. The formula still works now, but we no longer believe that mice arise all by themselves as was thought then. From the days of antiquity until quite recently it was believed that organisms arose by themselves from nonliving matter. The thinking then was that the process, called *spontaneous generation*, could be demonstrated by simple scientific observation. To deny it was thought to deny reality. After all, worms just appeared in apples, and frogs showed up in the mud in the springtime.

However, there were some doubters, and the battle over spontaneous generation turned out to be one of the most contentious in the history of science. It lasted for over two centuries.

4. SPONTANEOUS GENERATION

It was well known that the worm-like larval stage of flies, called maggots, appeared in decaying meat. Where did they come from? Francisco Redi (1626-1697) tried out different kinds of meat to see if they produced different kinds of maggots. He tried meat from snakes, pigeons, fish, sheep, frogs, deer, dogs, lambs, rabbits, goats, ducks, geese, hens, swallows, lions, tigers, and buffalo; but he always got the same kind of maggots!

Redi also noted that if meat was protected from flies, maggots did not appear. Could it be that the maggots came from flies and not from spontaneous generation?

Several leading scientists got involved in the battle. Many experiments involving the heating of broths, that usually generated some kind of scummy organisms, gave conflicting results and engendered antagonistic opinions.

4. SPONTANEOUS GENERATION

Then from the hand of the Frenchman Louis Pasteur (1822-1895), one of the best scientists of all time, came what many consider to be the death blow to spontaneous generation. Using cleverly designed flasks, he answered all the objections that the proponents of spontaneous generation raised. Pasteur proclaimed "Never will the doctrine of spontaneous generation recover from the mortal blow of this simple experiment."

Pasteur was wrong. At that same time in England, Charles Darwin was promoting variation and evolution of organisms. To some the implication was that if organisms could evolve from each other, could not life evolve from nonliving matter? At that time scientists had no idea how complex life was, and the idea of spontaneous generation gained support from burgeoning evolutionary concepts.

4. SPONTANEOUS GENERATION

The scientific data seems to be clear. Only life begets life.

However, if one is going to explain how life arose without God, life must have arisen spontaneously.

The scientific community would eventually follow the strange pathway of rejecting spontaneous generation for organisms that are now living, but accepting it for the first organism that appeared on earth billions of years ago. The process of generating that first organism is called chemical evolution. We will discuss that next.

5. CHEMICAL EVOLUTION

5. CHEMICAL EVOLUTION

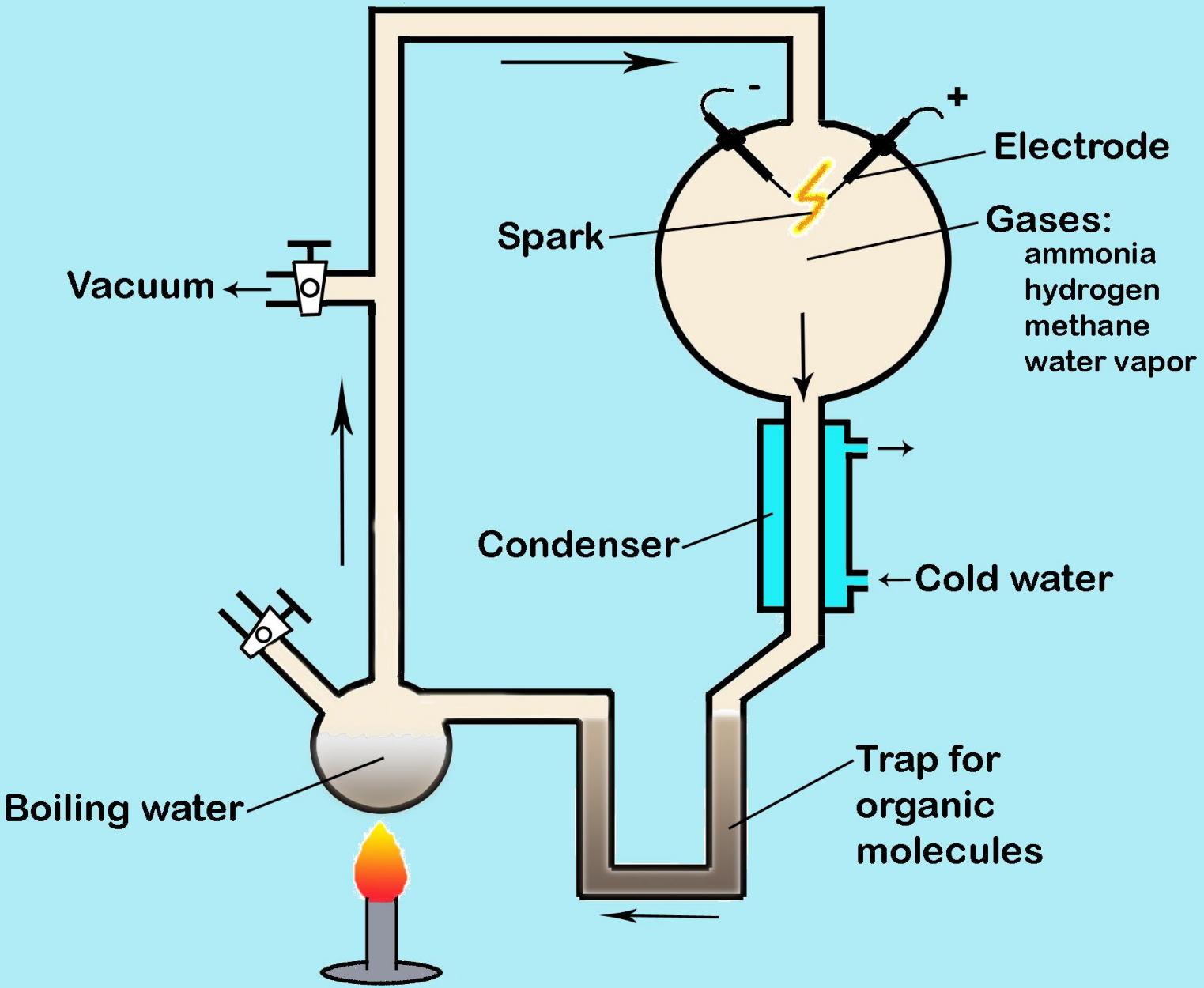
A lot of scientific research has been directed to trying to determine how life could arise all by itself. It is suggested that sometime, somewhere, in some kind of *warm organic soup*, conditions were such that life arose spontaneously. The research has produced a few simple molecules that encouraged evolutionary scientists, but recent findings about the complexity of life have created severe problems for chemical evolution.

For instance, the production of the various kinds of protein molecules can involve much more than just one DNA segment. One DNA gene can participates in the synthesis of a number of different proteins through information coming from other parts of the DNA and involving RNA, or splitting original proteins into two different ones. The more we learn, the more complicated life seems to be.

5. CHEMICAL EVOLUTION

A famous experiment (Miller-Urey), illustrated in the next slide, is often presented in basic biology textbooks to illustrate how life could have arisen by itself. Performed in 1953 by Stanley Miller at the University of Chicago, it tried to simulate conditions on a primitive earth. By exposing a mixture of the gases: methane - hydrogen, ammonia and water vapor - to sparks, a significant number of amino acids were produced and concentrated in a trap. The experiment has been improved upon and a few other simple molecules we find in living things were also produced, along with many molecules that have nothing to do with life, or are even detrimental to it.

MILLER-UREY EXPERIMENT



5. CHEMICAL EVOLUTION

This minor success of producing some simple organic molecules is the most significant result of the research in chemical evolution. The illustration in the last slide is found in many biology textbooks and has been presented to millions of biology students as evidence of how life could arise all by itself. However, producing a few organic molecules is hardly any help in explaining how life, that is extremely complex, could arise by itself. That evolutionists rely so heavily on these simple results to try and explain the origin of life reflects on how little evidence there is for the idea of chemical evolution.

5. CHEMICAL EVOLUTION

Objections to the significance of this minor success include the low concentration or absence of many life-specific molecules that were found. Also, do the conditions of the experiment, like a special trap that was used to gather the molecules, realistically represents conditions on an original primitive earth. That earth had no life, no laboratories or equipment, and no scientists.

We need to keep in mind that when a scientist goes into his laboratory and designs experiments based on his intelligence, using information and equipment gleaned from centuries of experience, he is doing more what we would expect from a perceptive creator God. That is not what we would expect to happen spontaneously, all by itself on an original empty earth and without any scientists present, as required by the evolutionary scenario.

5. CHEMICAL EVOLUTION

Because the above scenario is unsatisfactory, other ideas are considered by evolutionists and include:

- **Life originated from special information found in atoms.**
  There is no evidence for this.
- **At first there was a simpler kind of life on earth.**
  There is virtually no evidence for this either.
- **Life came from a self generating cycle of proteins and RNA.**
  The molecules involved are delicate and very hard to produce even in a laboratory. How could they arise and endure by themselves.
- **Life originated in hot springs in the deep ocean.**
  This is a limited and harsh environment; and where did the complex information in DNA that is necessary for complex life come from?
- **Life originated using clay minerals as a template.**
  Simple clay minerals do not have the complex information of DNA necessary for life.

5. CHEMICAL EVOLUTION

- **Life started as RNA molecules that have minute replication capabilities.**

  RNA is very difficult to synthesize, and when done, does not have the complex information necessary for life.

- **Life evolved elsewhere in the universe and then was transferred to earth on a comet or dust particle.**

  This is not much help, because the problems listed above for the origin of life on earth would apply elsewhere.

Chemical evolution has not provided any realistically plausible model for the origin of life. All the models fail to explain the origin of the vast integrated information we find on DNA that is so essential to the functioning and reproduction of even the simplest organism. The next few slides list some of the major problems.

6. TEN PROBLEMS FOR CHEMICAL EVOLUTION

6. PROBLEMS FOR CHEMICAL EVOLUTION

a. WHERE WAS THE SOUP?

Evolution needs a lot of "warm organic soup" to accommodate the immense improbabilities of chemical evolution. The more soup you have the greater the chance of improbable events. However, when you look at the deep primitive rocks of the earth where an evolutionist would expect life to have first evolved, you find no evidence of this carbon-rich organic soup. The physical and chemical evidence should be there if the soup ever existed.

6. PROBLEMS FOR CHEMICAL EVOLUTION

b. SELECTION OF THE NEEDED MOLECULES.

The right kind of molecules need to be selected from all the available ones for the first life. For instance in the Miller-Urey experiment mentioned above, more kinds of amino acids that are not useful in making proteins are produced than the 20 amino acids that are found in living organisms. When life first formed on earth, how did only the right kind of amino acids get selected for all the protein molecules needed while the others were left alone?

6. PROBLEMS FOR CHEMICAL EVOLUTION

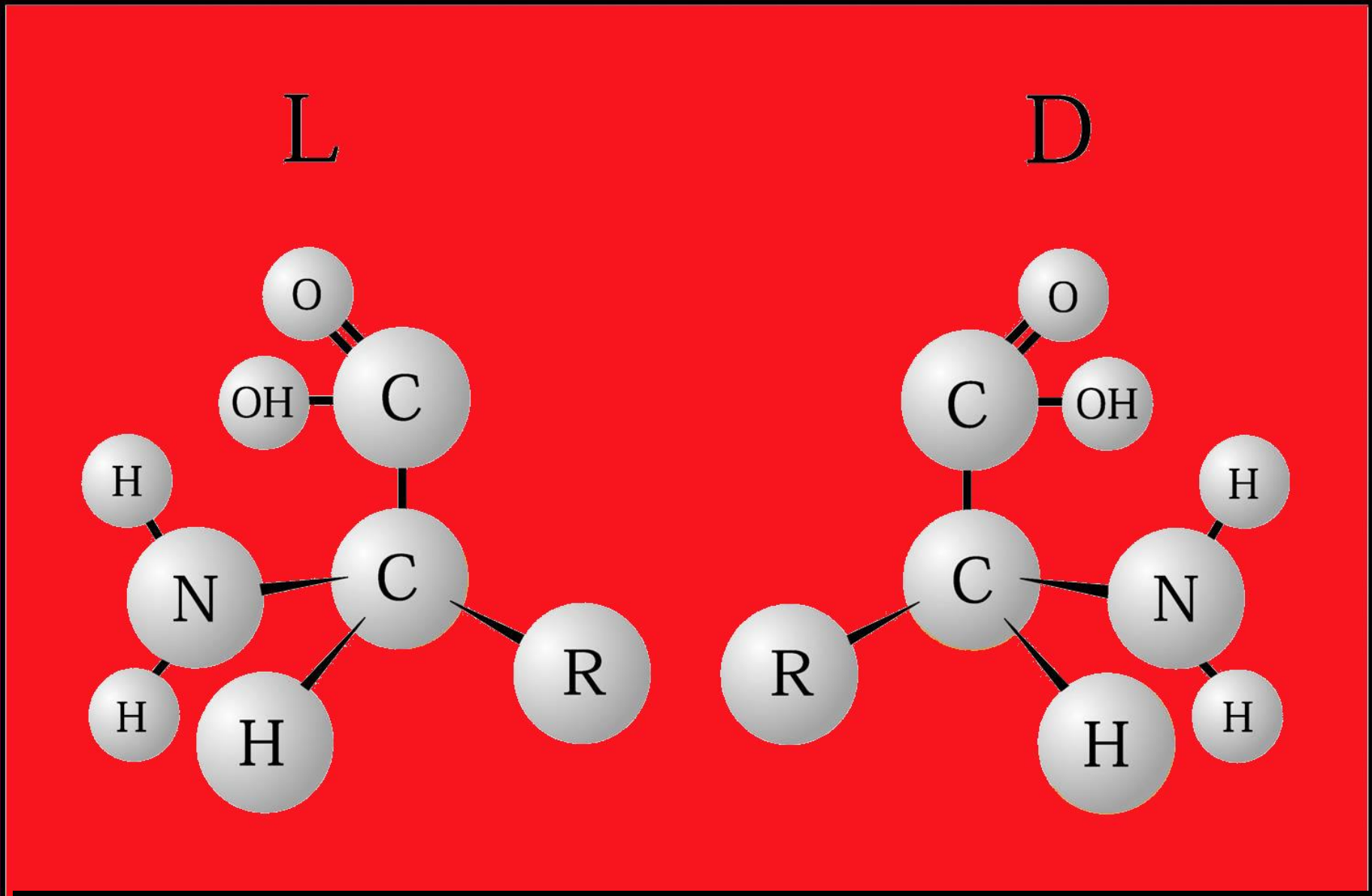
c. SELECTING THE RIGHT OPTICAL ISOMERS.

Your two hands are mirror images of each other. Amino acids, like your hands, can have mirror images of each other (optical isomers). When various amino acids are produced as in the Miller experiment, they have equal amounts of mirror images of each other. The two types are designated as L and D types based on optical activity. In the primitive soup you would have equal amounts of the L and D kinds of the various amino acids; however, in living things the amino acids are almost exclusively of the L type. How did the first life form select only L types of amino acids for their proteins? This is a baffling question for evolution.

6. PROBLEMS FOR CHEMICAL EVOLUTION

c. SELECTING THE RIGHT OPTICAL ISOMERS.

The figure in the next slide illustrates the L and D optical isomer pattern for amino acids. You can see that they are mirror images of each other. The “R” represents the complex part of the amino acid molecule, that we mentioned above, and that is different for each kind of amino acid.



L and D kinds of amino acids. Note that the two are mirror images of each other. The R spheres represent different arrangements of atoms that vary according to the different kinds of amino acids.

6. PROBLEMS FOR CHEMICAL EVOLUTION

d. ORGANIC MOLECULES WOULD NOT SURVIVE.

Organic molecules are delicate, and few would survive in the primitive atmosphere. Oxygen would destroy them, so it is assumed there was no oxygen. If they did happen to survive in the atmosphere, chances are they would be destroyed in the ocean.

You need a high concentration of the right molecules all at the **same place** and at the **same time** for the first life, and this is very extremely unlikely.

6. PROBLEMS FOR CHEMICAL EVOLUTION

e. FORMATION OF LARGE MOLECULES.

The amino acids, nucleotide bases, sugars, etc., of life are relatively simple molecules when compared to the huge molecules they form when they are combined to form proteins, DNA, or RNA. We can make a number of the simple molecules in the laboratory, but how did the large molecules that require highly specific organization, ever become organized by themselves? We need the specific information found on DNA for life to exist.

The smallest living organism we know of (i.e. a single cell called mycoplasma), has linear dimensions (length, width, etc.) about one half those of *Escherichia coli.* It has over half a million bases in its DNA that code for nearly five hundred different kinds of proteins.

6. PROBLEMS FOR CHEMICAL EVOLUTION

e. FORMATION OF LARGE MOLECULES.

Organisms need proteins to form DNA, and they need DNA to form proteins. You need both at the same time. Could this all happen by chance? Just the chance of forming one specific protein molecule consisting of one hundred specific amino acids seems incredibly small. One study places this at less than one chance out of 10^{190}. The next slide gives the specific number written out. Remember that each zero increases the improbability ten times.

Forming the specific DNA of organisms is much, much more improbable than forming a protein. It seems more reasonable to believe in miracles than to believe in such improbabilities.

PROBABILITY OF FORMING A PROTEIN MOLECULE (100 SPECIFIC AMINO ACIDS)

The chance is only:

1 (one) out of the number

**490000000000000000000000000000000
000000000000000000000000000000000000
000000000000000000000000000000000000
000000000000000000000000000000000000
000000000000000000000000000000000000
000000000000000. [190 “0”s]**

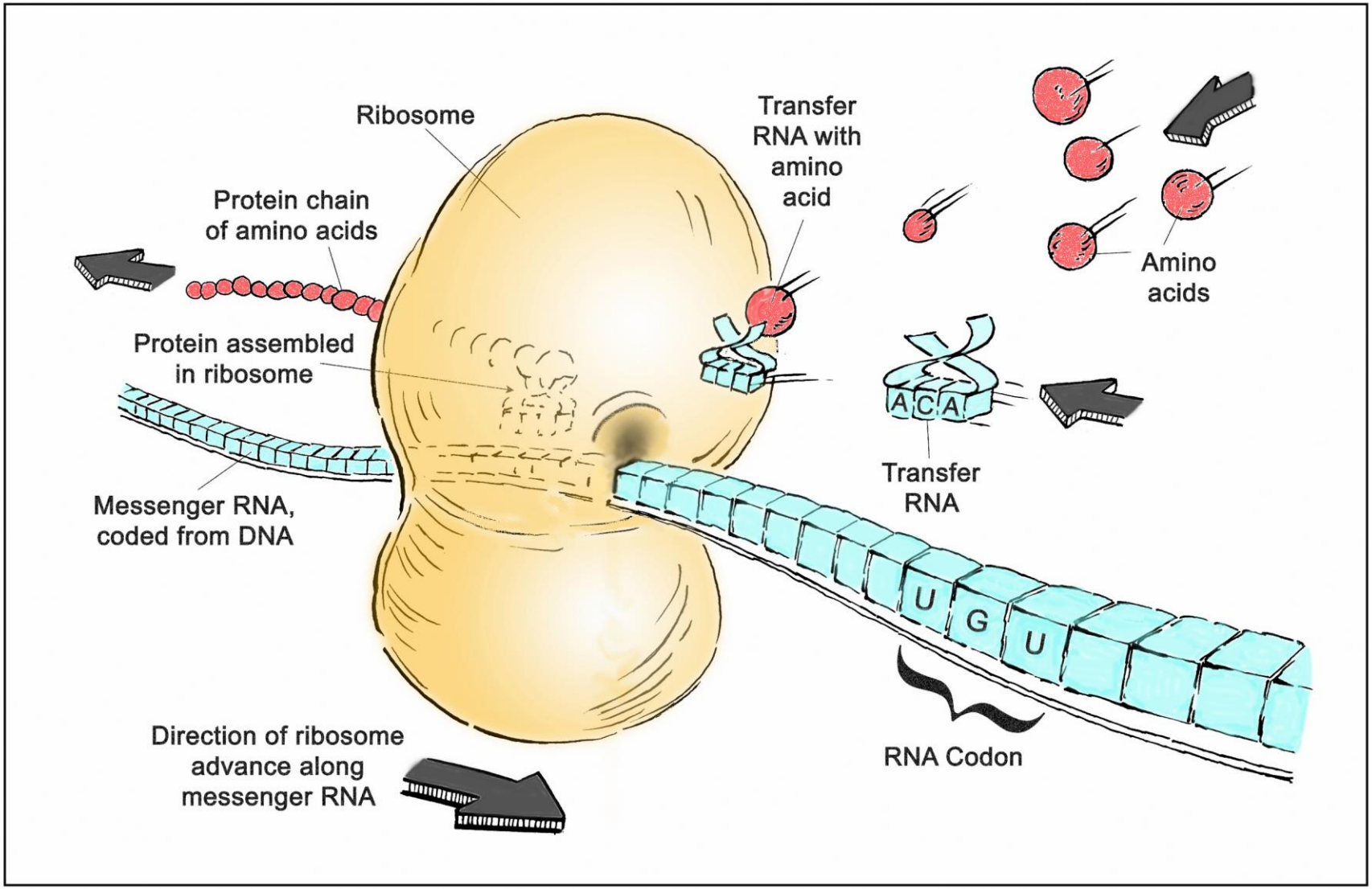
Reference: Bradley and Thaxton, 1994. In Moreland JP. The Creation Hypothesis, p 173-210.

6. PROBLEMS FOR CHEMICAL EVOLUTION

f. THE ORIGIN OF THE GENETIC CODE.

Earlier we talked about how three bases on DNA or RNA code for one kind of amino acid; but how does an amino acid know what its code is? There are 20 special molecules (*aminoacyl-tRNA synthetase*), one for each kind of amino acid, that recognizes its kind of amino acid, and also recognizes the right kind of transfer RNA that has the genetic code (codon) for that kind of amino acid. In the illustration of a ribosome, which is repeated in the next slide, these special molecules connect the right kind of amino acid (pink spheres) to the right kind of transfer RNA (3 blue blocks). The transfer RNA is then matched to the genetic code on messenger RNA (long blue rod) in the ribosome, that originally obtained its formulation from the DNA of the cell.

RIBOSOME



Based on Figure 4.6 in Harold, FM, 2001. The Way of the Cell.

6. PROBLEMS FOR CHEMICAL EVOLUTION

f. THE ORIGIN OF THE GENETIC CODE.

The problem for evolution is to explain how the genetic code for the various amino acids on DNA got started by random changes. And how did the special molecules that could read the RNA with the right code and match it to the right amino acids evolve? As for any language, the speaker (DNA) and the listener (special molecules along with transfer RNA) must use the same language (genetic code). The language is absolutely necessary so as to produce the right kind of protein molecules. All codes need to first work properly if you are going to have life.

6. PROBLEMS FOR CHEMICAL EVOLUTION

g. BIOCHEMICAL PATHWAYS.

A living cell needs many kinds of specific organic molecules. It commonly takes a series of steps to produce these molecules as intermediates are gradually changed to what is needed. The series of steps is called a **biochemical pathway** and they abound in living organisms. Each step along the assembly line is facilitated by a special protein **enzyme** for that step.

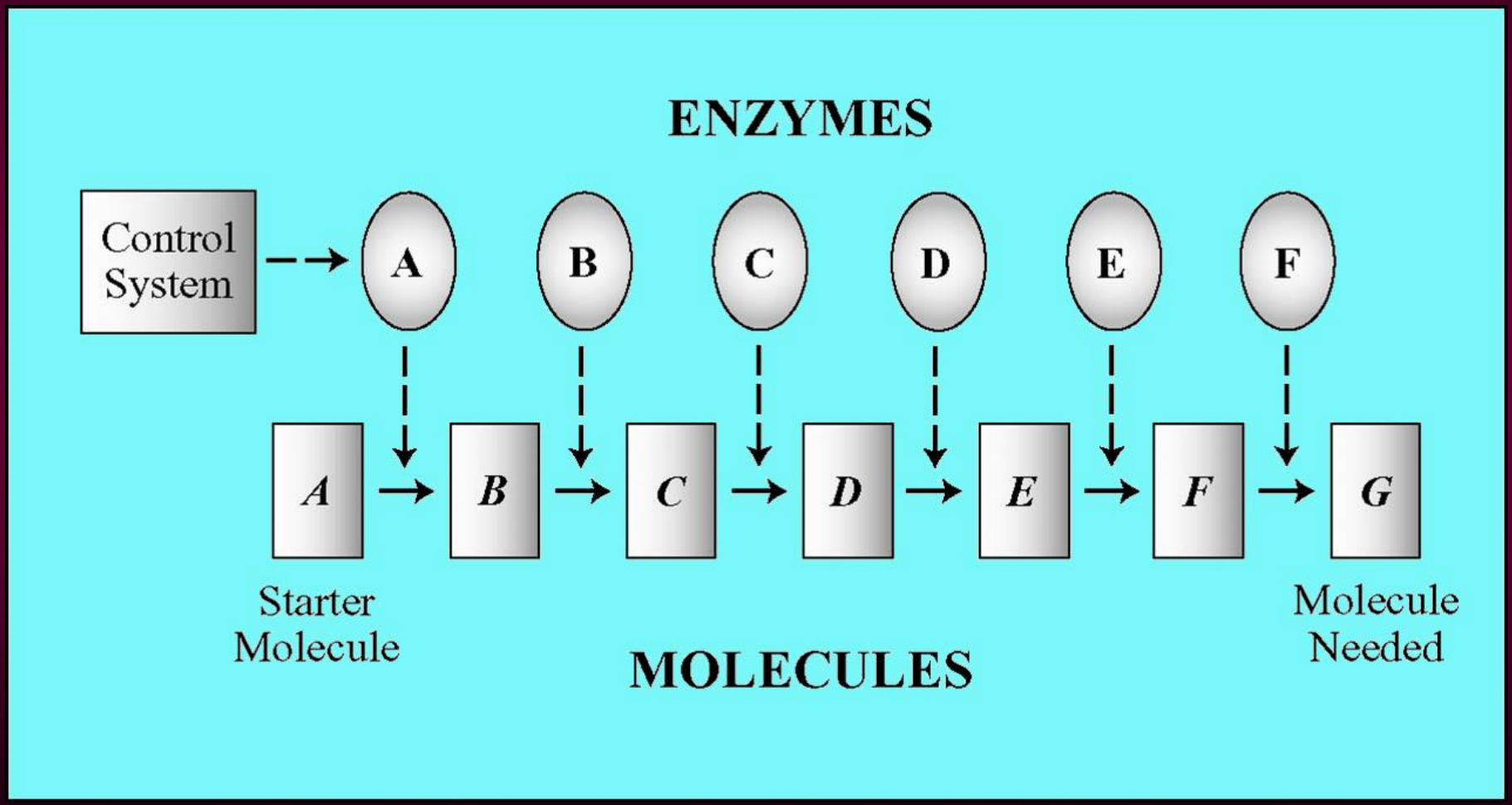
It is implausible that a whole complex biochemical pathway could suddenly appear all at once by chance. How could such complex systems evolve gradually when there is likely no evolutionary survival value until all the steps are in place to produce the needed molecule?

6. PROBLEMS FOR CHEMICAL EVOLUTION

g. BIOCHEMICAL PATHWAYS.

A biochemical pathway and its enzymes is illustrated in the next slide. These biochemical pathways have to be regulated or the chemical changes in the cell will be totally out of control. Fortunately living things have complicated **regulatory systems**. So a further problem for a slow unguided evolutionary process is: which evolved first, the uncontrolled biochemical pathway or its control system? Both seem essential to provide evolutionary survival value. Living things require that very many complex things all appear at the same time.

BIOCHEMICAL PATHWAY



6. PROBLEMS FOR CHEMICAL EVOLUTION

h. HOW DID CELLS FORM?

There is a huge chasm between the simple disorganized molecules of the Miller-Urey experiment mentioned above and a "simple" living cell. Furthermore, advanced organisms have cells that are more complicated than a simple microbe, and evolution has to account for all the parts, which include membranes, fibers, chromosomes, mitochondria, ribosomes, etc.

Besides that, life is not just a bunch of chemicals in a bag; these would soon come to chemical equilibrium where they are essentially inactive compared to the rapid controlled metabolic chemical changes and biochemical pathways of living things. At chemical equilibrium you are dead. For life you need to have lots of activity including biochemical pathways up and running.

6. PROBLEMS FOR CHEMICAL EVOLUTION

h. HOW DID CELLS FORM?

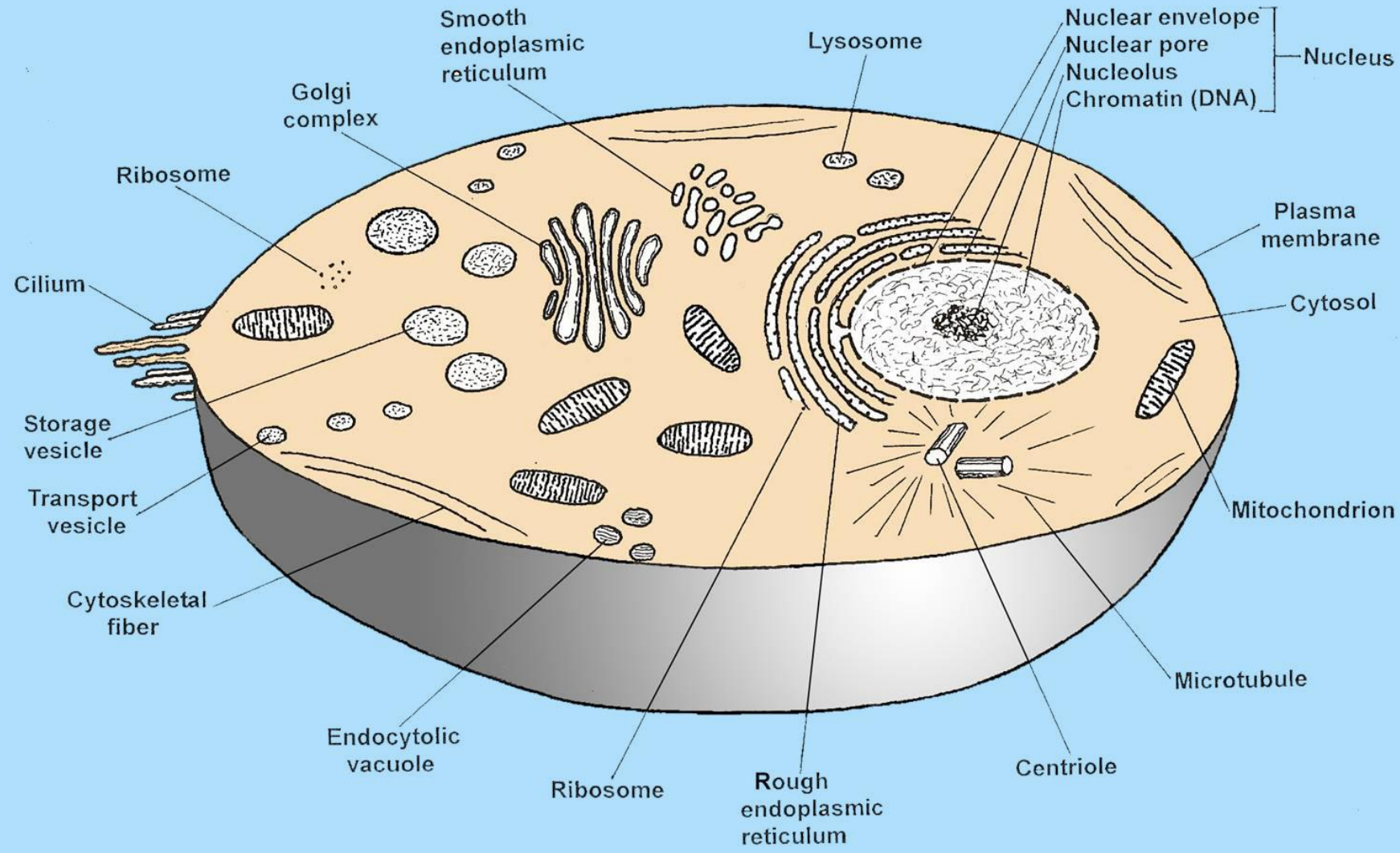
What is the probability (chance) that the smallest independent organism we know of (mycoplasma) might appear spontaneously? Using thermodynamics (the energy relationships of atoms and molecules) the biochemist Harold Morowitz, who favors evolution, calculates that the chance is just one out of $10^{5,000,000,000}$. That is one chance out of 1 followed by 5 billion "0's", and each "0" increases the improbability ten times. [REFERENCE: Morowitz HJ. 1968. Energy Flow in Biology: Biological organization as a problem in thermal physics. New York, London: Academic Press, p 67.]

6. PROBLEMS FOR CHEMICAL EVOLUTION

h. HOW DID CELLS FORM?

The next slide illustrates some of the parts of a typical animal cell cut open to expose internal details. The majority of these parts are essential for life and would be part of the simplest life we can conceive of.

ANIMAL CELL

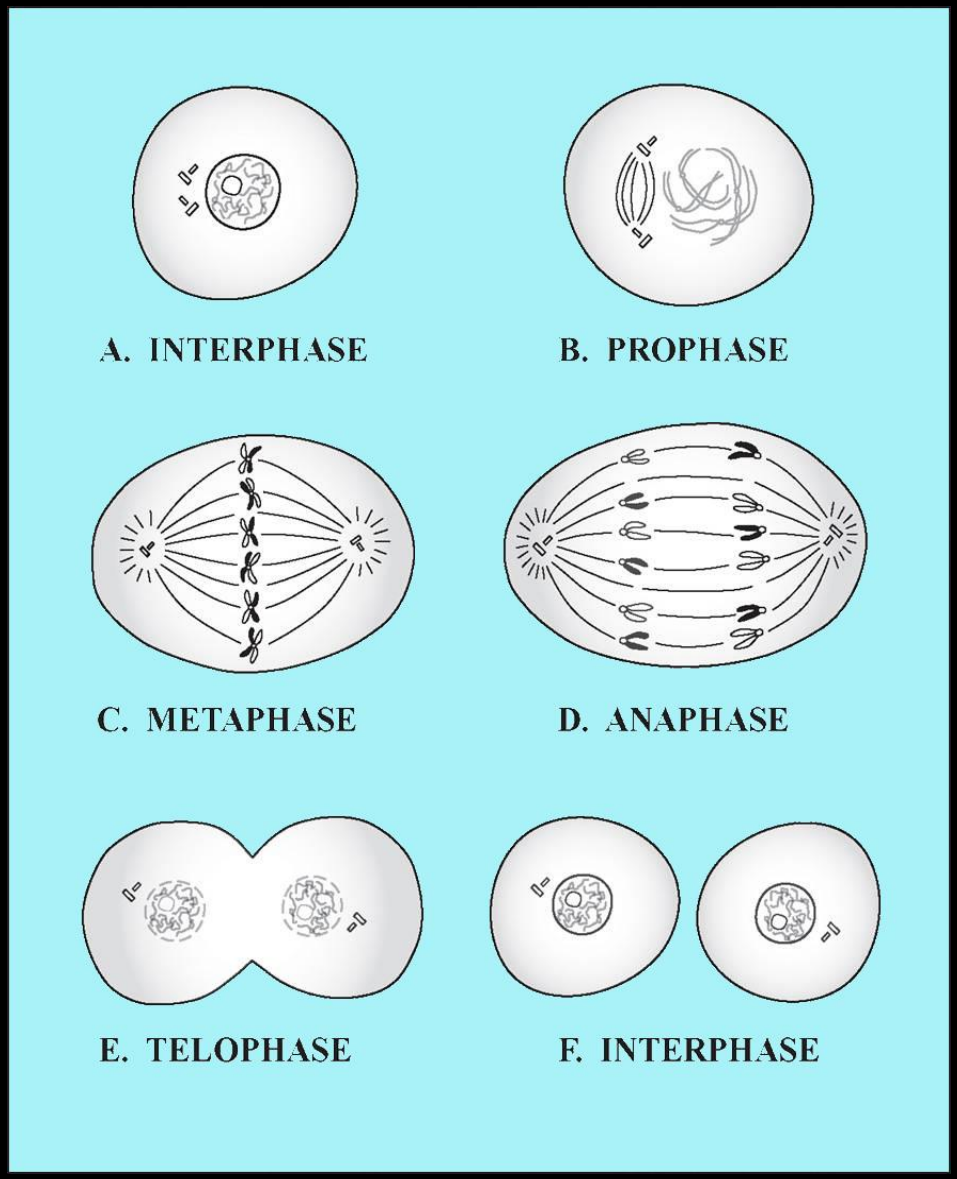

Smooth endoplasmic reticulum
Lysosome
Nuclear envelope
Nuclear pore
Nucleolus
Chromatin (DNA)
Nucleus
Golgi complex
Ribosome
Plasma membrane
Cilium
Cytosol
Storage vesicle
Transport vesicle
Mitochondrion
Cytoskeletal fiber
Microtubule
Endocytolic vacuole
Ribosome
Rough endoplasmic reticulum
Centriole

6. PROBLEMS FOR CHEMICAL EVOLUTION

i. HOW DID REPRODUCTION GET STARTED?

To have the first evolved cell just sitting there is not going to establish life on earth. Before it dies, that cell needs to duplicate itself. All the necessary parts including DNA need to be replicated and distributed to the new cell. Reproduction is complex and coordinated. A simplified example of reproduction for animal cells is illustrated in the next slide. Sexual reproduction is much more involved. Evolution does not have a realistic suggestion for how reproduction came about by itself.

SIMPLE REPRESENTATION OF THE PROCESS OF CELL DIVISION



A. INTERPHASE: Resting cell

B. PROPHASE: Nuclear membrane breaks down and DNA condenses into double rod-shaped chromosomes.

C. METAPHASE: Chromosomes line up on a plane between prospective cells, and paired centrioles migrate to opposite poles.

D. ANAPHASE: Chromosome pairs separate and are drawn to opposite poles.

E. TELOPHASE: Constriction proceeds. Nuclear membrane is restored and organization into two cells continues.

F. INTERPHASE: Two resting cells

6. PROBLEMS FOR CHEMICAL EVOLUTION

j. ORIGIN OF THE DNA PROOFREADING AND EDITING SYSTEM.

When the DNA is rapidly replicated, some errors in copying the genetic code occasionally occur. Some of these errors are harmless, rarely one may be beneficial, while most are detrimental or fatal. Fortunately there are special complex systems consisting of many proteins that proofread the copied DNA code, remove errors and replace them with correct bases. Without these proofreading and correcting systems, life as we know it would not be possible.

The problem this poses for evolution is: how, in a gradually evolving life scenario, did any life survive before the elaborate DNA proofreading and editing system had evolved? For life you need both DNA reproduction and a correcting system.

7. A SHOCKING INCIDENT

7. A SHOCKING INCIDENT

On December 9, 2004 the Associated Press broke the news that the legendary atheist Antony Flew had changed his mind and decided that there must be a God. The stunning news spread over the world.

Flew is famous, having led in the cause of atheism for half a century. He is a highly respected scholar, having written some two dozen books on philosophy. He has been called the world's most influential atheist. The academic community that promulgates a secular stance could hardly believe the news of this reversal in Flew's basic world view. Flew's dramatic turnaround, which occurred about a year earlier, did not result in him joining a formal religion. He just decided that there has to be a God.

7. A SHOCKING INCIDENT

Why did Flew reverse himself? The answer is simple. He did it because of the scientific data. In his own words, He "had to go where the evidence leads." The data that most impressed him includes the fine tuning of the universe, the complexity of the DNA information, and the ability of living organisms to reproduce themselves. He points out that evolutionary leaders such as Richard Dawkins at Oxford University and Charles Darwin who wrote *The Origin of Species* have especially ignored the problem of the origin of biological reproduction.

8. CONCLUDING COMMENTS

8. CONCLUDING COMMENTS

Scientists have had some success in creating simple organic molecules, such as amino acids, under assumed primitive earth conditions. Beyond that there has been mainly a plethora of insurmountable problems for chemical evolution. The huge DNA molecules have to have an enormous amount of precise information that is fed to the rest of the cell through the genetic code, and all of this has to be able to reproduce itself. A perceptive creator God seems essential to explain the intricate complexities and to get even the simplest form of life started. The origin of life is evolution's most baffling problem.

8. CONCLUDING COMMENTS

Mathematical calculations all indicate virtually impossible probabilities that life could arise by itself. One may choose to believe that life arose spontaneously, but such a belief has to be based on blind assumptions, not on mathematical validity or scientific evidence.

The failure of chemical evolution to provide a workable model, and the persistence of science in trying to make it work, raises a serious question. Is the current practice of science an open search for truth about nature, or is it a secular agenda that tries to exclude God from the explanatory menu? Something seems askew.

9. REVIEW QUESTIONS

(Answers given later below)

9. REVIEW QUESTIONS – 1

(Answers given later below)

1. Why is a virus not considered to be a live organism? What is the significance of this for the spontaneous origin of life?

2. In a single tiny *Escherichia coli* organism there are over 4 thousand different kinds of protein molecules replicated to form over 2 million protein molecules, and a host of other kinds of molecules like fats (lipids), and RNA and DNA. What problems does such complexity pose for evolution?

3. What is the significance of the fact that the Miller-Urey experiment has been promulgated over the earth as the icon for the spontaneous origin of life?

4. What is the evidence for creation when one considers how ribosomes assemble proteins?

5. We discussed above 7 other suggestions by evolutionist, in addition to the Miller-Urey experiment, for the spontaneous origin of life. What is the significance of the fact that there are so many other suggestions as to how life may have arisen all by itself?

REVIEW QUESTIONS - 2

6. Below is a listing of 10 problems for chemical evolution that were presented above. Briefly explain why each of these is a problem for evolution. Some of them involve several problems.

   a. Where was the soup?

   b. Selection of needed molecules

   c. Selecting the right optical isomer

   d. Organic molecules would not survive

   e. Formation of large molecules

   f. Origin of the genetic code

   g. Biochemical pathways

   h. How did cells form?

   i. How did reproduction get started?

   j. Origin of DNA proofreading and editing system

7. What is significant about the kind of data that convinced the atheistic philosopher Antony Flew that there must be a God?

REVIEW QUESTIONS AND ANSWERS - 1

1. Why is a virus not considered to be a live organism? What is the significance of this for the spontaneous origin of life?

Viruses cannot reproduce themselves and reproduction is a cardinal characteristic of living things. Viruses are reproduced by the reproductive mechanisms of the cell they inhabit. Since they cannot reproduce themselves they could not be a viable intermediate in the spontaneous origin of life.

2. In a single tiny *Escherichia coli* organism there are over 4 thousand different kinds of protein molecules replicated to form over 2 million protein molecules, and a host of other kinds of molecules like fats (lipids), and RNA and DNA. What problems does such complexity pose for evolution?

Escherichia coli *has many different kinds of molecules and well illustrates how complex even a tiny microbe can be. How could such complexity arise all by itself at the same time and place on Earth? Even though* Escherichia coli *is not the smallest kind of free living organism, we use it here because we know much more about it.*

REVIEW QUESTIONS AND ANSWERS - 2

3. **What is the significance of the fact that the Miller-Urey experiment has been promulgated over the earth as the icon for the spontaneous origin of life?**
   The Miller-Urey experiment produces simple building blocks, like amino acids, that are needed to make the larger molecules needed for life. There is a huge chasm between these simple building blocks and the simplest forms of independent life that we know of. Evolutionists need to present a great number of other more complicated experiments that eventually produce life in order to even just show that their model is a valid possibility.
4. **What is the evidence for creation when one considers how ribosomes assemble proteins?**
   The process of making protein in ribosomes involves a large array of many different specialized parts like a different RNA and aminoacyl-tRNA molecule for each kind of amino acid. These all have to work together in order to produce the right protein molecule. It does not seem possible that all the parts of this complex mechanism ever got put together at the same time and place without a perceptive creator to design and organize the various parts.

REVIEW QUESTIONS AND ANSWERS - 3

5. **We discussed above 7 other suggestions by evolutionists, in addition to the Miller-Urey experiment, for the spontaneous origin of life. What is the significance of the fact that there are so many other suggestions as to how life may have arisen all by itself?**

   The Miller-Urey experiment has not provided a convincing scenario of how life could have originated all by itself, hence other models are being considered. All the models for chemical evolution have not provided any realistically plausible choice for the origin of life, which is part of the reason why there are so many. All the models fail to explain the origin of the vast integrated information we find in DNA that is so essential for the formation of proteins and the functioning and reproduction of even the simplest organism.

REVIEW QUESTIONS AND ANSWERS - 4

6. Below is a listing of 10 problems for chemical evolution that were presented above. Briefly explain why each of these is a problem for evolution. Some of them involve several problems.

a. Where was the soup?
b. Selection of needed molecules
c. Selecting the right optical isomer
d. Organic molecules would not survive
e. Formation of large molecules
f. Origin of the genetic code
g. Biochemical pathways
h. How did cells form?
i. How did reproduction get started?
j. Origin of DNA proofreading and editing system

For answers just go to these topics given in the main discussion section. They are given there in the same order as listed here.

REVIEW QUESTIONS AND ANSWERS - 5

7. What is significant about the kind of data that convinced the atheistic philosopher Antony Flew that there must be a God?

It was the scientific data that convinced him. On the other hand, science as presently practiced does not accept God as an explanation for what it discovers. Flew has been especially impressed with the fine tuning of the universe, the complexity of DNA and biological reproduction. This authenticates the biblical statement in Romans 1:20, mentioned in an earlier discussion, indicating that because of the things that are seen, there is no excuse for not believing in God. There is plenty of scientific data that authenticates creation by God.

ADDITIONAL REFERENCES

For further discussions by the author (Ariel A. Roth) and many additional references, see the author's books titled:

1. ORIGINS: LINKING SCIENCE AND SCRIPTURE. Hagerstown, MD. Review and Herald Publishing Association.
2. SCIENCE DISCOVERS GOD: Seven Convincing Lines of Evidence for His Existence. Hagerstown, MD. Autumn House Publishing, an imprint of Review and Herald Publishing Association.

Additional information is available on the author's Web Page: Sciences and Scriptures. www.sciencesandscriptures.com. Also see many articles published by the author and others in the journal ORIGINS which the author edited for 23 years. For access see the Web Page of the Geoscience Research Institute www.grisda.org.

Highly Recommended URLs are:

Earth History Research Center http://origins.swau.edu

Theological Crossroads www.theox.org

Sean Pitman www.detectingdesign.com

Scientific Theology www.scientifictheology.com

Geoscience Research Institute www.grisda.org

Sciences and Scriptures www.sciencesandscriptures.com

Other Web Pages providing a variety of related answers are: Creation-Evolution Headlines, Creation Ministries International, Institute for Creation Research, and Answers in Genesis.

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