Part 4A REVISION and EXPANSION of Part 3

Evolution is the belief that life originally formed due to the natural properties of matter, energy and time. Changes which have produced all present life forms have been naturalistic. The terms **random** and **chance** have often been used to describe processes involved in evolution. However, these are not very satisfactory. The behaviour and reactions of organic molecules are only an expression of the natural properties they already possess. Therefore results obtained from scientific experiments involving such molecules are neither random nor chance. Saying something happened **randomly** or by **chance** usually means we don't know how or why it happened. It is a way of stating our ignorance of the process rather than what the process actually was.

So far we have summarised General Evolution with the formulae:

$$\text{Matter} + \text{Energy} + \text{Time} \xrightarrow{NP} \text{Life form 1}$$

$$\text{Life Form 1} + \text{Matter} + \text{Energy} + \text{Time} \xrightarrow{NP} L_2 + L_3 + L_4 \text{ ...etc.}$$

$$M + E + T \xrightarrow{NP} L_2 + L_3 + L_4 \text{ ...etc.}$$

Complex present day life forms, such as Darwin's finches, are the result of a process where non-living matter became biological molecules which became cells, which evolved into simple animals, which became reptiles, then finally birds. At each transition, new structures were added, some were lost, and existing structures became more complex. **Information** was somehow added to the **DNA code**.

The transition from reptile to birds is a good example to consider just how much Information had to change. In a reptile lung, air is drawn straight into the lung then forced out the same way. Air moves in two directions in the lung but oxygen is extracted only on the **breath in** or 50% of the time. Birds have a complicated breathing system where air is drawn into the lung, then passed through a system of air sacs before being exhaled. The air passes only one way through the lung which enables a continuous and more efficient gas exchange than reptiles, the air is useful 100% of the time. Birds need huge amounts of oxygen to fly. In order for a reptile lung to evolve into a bird lung, a large amount of DNA information for a new lung system must be added and some removed (i.e. the DNA information for a reptile lung).

Somewhere further back in the evolutionary process the information for lungs was added to life forms which did not have lungs. The evolutionary origin and development of lungs could be summarised:

$$\text{No cell} \xrightarrow{NP} \text{cell (no lung)} \xrightarrow{NP} \text{Reptile with lung} \xrightarrow{NP} \text{Bird with different lung}$$

In terms of **DNA**, this evolution has been:

$$\text{No DNA} \xrightarrow{NP} \text{DNA (no lung)} \xrightarrow{NP} \text{DNA (reptile lung)} \xrightarrow{NP} \text{DNA (bird lung)}$$

In terms of Information, evolution has proceeded from

$$\text{(No DNA code) No Information} \xrightarrow{NP} \text{(DNA code) Information} \rightarrow \text{DNA (birds) New Information}$$

At each step, the natural properties of the system have enabled information, which did not previously exist, to be added to the DNA code. Which brings us back to what has been discovered about codes.

Stop or Arret?
The information communicated by a code is not due to **Natural Properties** of the parts of the code. Look at the different ways the information **STOP** can be put into code.

English	Stop
French	Arret
Computer	Exit (coded in 0's and 1's)

In the above examples the coded information is not produced by the individual parts or components of the code, ie the information in the English product **STOP** is not due to the Natural Properties of the parts **S,T,O,** or **P**, any more than the French word for stop is due to the properties of **A,R,E** or **T**. Individual code letters and words have only the meaning we invent for them.

U, T, A Problem?
A similar situation exists for DNA and RNA code. DNA contains the code for making RNA, which then uses the copied code to link amino acids into proteins. DNA 'spells' the instruction *stop making proteins* with any one of the codes ATT, ATC or ACT. These are copied by RNA. The actual chemical letters (U, A, G, and C) used for RNA code are different than those of DNA (T, A, G, and C). Therefore RNA uses the codes UAA, UAG or UGA when it transfers the instruction *stop making a protein*. So when DNA uses the chemical letter **A** (**adenine)**, RNA copies it with the chemical letter **U (uracil).** This is different than the normal DNA copy of **A** which is **T** (**thymine).** Even though the code symbols are different, the same information is accurately transferred from DNA to RNA for each protein made by a cell. This brings us to a crucial question:

Where in the cell is the original information to build the cell?
You may say on the DNA. But the proteins from which a cell is built are not made directly by DNA. Proteins are made using the information on RNA, and three different types of RNA are involved:

1. **Messenger RNA (mRNA)** is made in the nucleus of the cell and carries copies of information from DNA out of the nucleus to the place in the cell where proteins are assembled.

2. **Transfer RNA (tRNA)** collects the right amino acids and brings them to the site where proteins are assembled. As there are twenty different amino acids there are twenty different **tRNAs**.

3. **Ribosomal RNA (rRNA)** is the RNA found on the ribosomes which enables the instructions for building proteins to be read from mRNA.

In order to make a protein, **mRNA** is attached to a ribosome which contains **rRNA**. The code is "read" and the appropriate **tRNAs** then bring the correct amino acids to the ribosomes for making the protein. Such a process also makes the proteins of **DNA polymerase** which then move back into the cell nucleus to unzip the double stranded DNA, copy the strands, and remove any errors which occur when DNA is being reproduced.

So, where is the ultimate source of information?
Is it in the DNA? Is it in the DNA polymerase protein which can edit and correct any miscopied DNA information? Is it in the RNA which acts as a reading, translating and collecting system to make polymerase proteins?

Consider again where the information is in a **STOP** sign? It is not in the letters on the sign. A French **ARRET** sign and an English **STOP** sign display different symbols but mean the same thing. Is the information in the minds of drivers who read the signs who fear the police who work for governments who put up the signs to fine you — when you do not **S,T,O**, then **P**? How many people **STOP,** when they know there are no police around? Does the absence of police make the information in **STOP** go away?

In the cell we have a system where DNA, three types of RNA and many other proteins combine to make a DNA polymerase protein, which then reads DNA, helps it make a copy and edits any mistakes. In each of these substances the information is encoded by different chemicals. Since the DNA/RNA/protein system is a multi-step system, this system cannot function unless all parts work. Which means all the information it contains had to be present before the system could work at all. To date such code and behaviour properties seen in DNA have only been observed to originate when an information system has been unnaturally created!

PART 4B WHAT MUTATIONS ACTUALLY DO

Altering DNA

As well as claiming that DNA information for the first cell arose by natural processes, General Evolutionary theorists claim that DNA information has since been altered by natural processes in order to produce many different life forms. For this to be true, natural processes which change the DNA, such as mutations, must be able to add new and useful DNA information to cells. Some examples of alterations or mutations to the DNA code and their effects are listed below.

Type	Examples of Effect	Effect on DNA Information
1. Substitution	**Sickle cell anaemia** **Colour blindness** **Haemophilia**	**Information loss**
2. Insertion	**useless proteins**	**Information loss or damage**
3. Deletion	**useless proteins**	**Information loss or damage**
4. Frame shift	**useless proteins**	**Information loss or damage**
5. Chromosomal	**Down's syndrome** **Some lymphomas and leukaemias**	**Extra copy of a chromsome, but no new information** **Information moved from one chromosome to another**
6. Intron mutation	**neutral**	**No effect on Information**
7. Genetic engineering	**Improved character**	**Increase in information**

The first six types of alteration to DNA occur due to environmental processes acting on the **Natural Properties** of DNA. The alterations result in loss of information, damage to information or no observed effect on information. Loss or damaged information means information from the changed DNA is still transferred to RNA and a protein made, but the protein is less useful to the cell than the normal one.

The effects on DNA can be summarised:

$$\text{(DNA) Matter + Energy + Time} \xrightarrow{\text{NP}} \text{loss of information, damaged information or no observed effect}$$

The only increase in DNA Information ever observed has come from the genetic engineering of DNA. But genetic engineering is the result of **Outside Information** being added to the system by a Creator, in this case Man.

$$\text{DNA + Matter + Energy + Time} \xrightarrow{\textbf{Outside Information}} \text{increase in information}$$

Observed Mutations of DNA

Many examples of mutations to human DNA have been described. Most are diseases and a small number have no known effect. One reason we are careful about radiation and chemicals in the environment is they are known to be Natural Processes which alter DNA. No one has suggested we explode nuclear bombs to add radiation to the atmosphere in the hope it might improve the human race by good mutations. The Chernobyl Nuclear Reactor accident in Russia is still producing disease in the local population.

$$\text{Human DNA + Energy + Time} \xrightarrow{\text{NP}} \text{diseases, or neutral variations}$$

Fruit Flies

Fruit flies (Drosophila melanogaster) have been used for many years to study the effects of changing DNA. Experimenters have exposed fly DNA to radiation and chemicals. The results have been flies with minor changes to eye colour, flies with varying degrees of disability from altered wing shapes so the fly can't (fly that is), to massive DNA alterations so the flies die.

$$\text{Fly DNA} + \text{Energy} + \text{Time} \xrightarrow{\text{NP}} \text{mostly damaging variations (and some neutral)}$$

Bacteria

One problem in looking for DNA changes is that you don't usually see them until the next generation. In humans it takes about 20 years to produce the next generation. For this reason most studies on mutations are on short lived organisms such as flies where the next generation is only a few weeks away, or bacteria which may have a generation time of 20 minutes. In such short lived organisms we can observe many generations in a short time. In 20 years of research we can observe millions of bacterial generations - so experiments on how much evolution can be achieved by natural processes are feasible on bacteria.

To date, all observed bacterial mutations caused by natural process show they have produced only variations of the original bacteria. Such experiments on millions of generations of bacteria have not yet managed to evolve one type of bacteria even to a differing type of bacteria, let alone produce organisms which are not bacteria.

$$\text{Bacterial DNA} + \text{Energy} + \text{Time} \xrightarrow{\text{NP}} \text{variations of the original bacteria only}$$

What about antibiotic resistance in bacteria?

After the second world war as penicillin and other antibiotics became freely available it was noticed that bacteria which were initially killed by antibiotics, were slowly becoming immune. It was thought they were evolving resistance, i.e. their DNA was gaining new information which helped counter the effect of antibiotics. However, studies on bacteria found in soil stored in containers sealed hundreds of years before the discovery of antibiotics, have shown there has always been some bacteria which carried DNA information for antibiotic resistance. The correct explanation is that originally non-resistant bacteria were killed by the new antibiotics, leaving already resistant bacteria to survive and multiply to become the dominant bacteria in the general population. They did not evolve the resistance, they inherited it.

It has also been discovered that the DNA information for antibiotic resistance is carried on a piece of DNA (a plasmid) which can be shared with other bacteria, so resistance can spread rapidly through a bacteria population.

What we have observed over the past 50 years is a process where useful existing DNA information has been selected for, copied and shared, but not spontaneously generated or evolved. Natural processes have not been observed to increase the information on bacterial DNA, but they can and do select out information which is already there so it becomes noticed.

Genetic Engineering

Scientists have been able to take portions of human DNA coding for proteins, such as insulin and insert them into bacteria. The bacteria's protein making machinery then makes this protein for which bacteria have no use. Such insulin can then be harvested by man for treating people who are

insulin deficient (diabetics). This addition of information (to make insulin protein) which is new to the bacteria has only been observed to happen when man manipulates the bacteria and adds DNA information which previously existed outside the bacteria.

Bacterial DNA (no insulin gene) + Energy + Time $\xrightarrow{OI}$ Bacterial DNA (with human insulin gene)

Maintaining DNA Information

One most impressive property of DNA is its stability. It contains many mechanisms which enable it to resist change to its information. These mechanisms include:

Double Copy

DNA is double stranded. Its information is coded twice using a **matching reciprocal code** on each strand, eg. **A** (Adenine) on one strand is coded by **T** (Thymine) on the other strand, **G** on one strand is always matched with **C**. When a cell divides each new cell receives DNA containing one of the original strands plus a newly made reciprocal copy.

Copy Check and Edit

When DNA is being copied, DNA polymerase acts as a copy, check and edit mechanism to prevent errors of copying.

Damage Repair

The cell has a 'repair crew' which enables it to correct ultra-violet radiation damage to the DNA. In normal DNA the opposite strands are linked together by weak bonds. When a DNA molecule is exposed to UV radiation these weak bonds may be broken. Usually they reform. But if two thymines (T) are side by side on one strand they have a tendency to form a sideways bond with each other instead of rejoining with the other strand. This sideways bond is called a **thymine dimer** and prevents the DNA code from being read in that place. The cell has a group of proteins (the repair crew) which constantly survey the DNA and when they find one of these thymine dimers they cut out the piece of the strand containing the dimer. Then using the sequence of bases on the opposite strand they rebuild the deleted piece. This is only possible because the opposite strand contains the matching code in the reciprocal form A, which is not affected by UV radiation damage.

Positive Redundancy

DNA uses a code which has 4 chemical letters T, C, A, G which are used 3 at a time. Each combination of 3 code letters is called a **codon**. Four different letters used 3 at a time means there are 64 possible combinations of letters. Since only 20 amino acids are used by DNA via RNA to make protein, many amino acids have more than one way of being 'spelt'. (Some amino acids, such as Argenine, Leucine and Serine, have 6 different codons.) This enables plenty of back up information.

Introns

Each gene contains a number of **introns** which are lengths of DNA **not** used to make proteins. They act as pauses in a genetic sentence. Changes in **intron DNA** have never been observed to affect protein which is coded for by the DNA on either side of the intron. RNA copies **DNA introns**, but the introns are actually removed before any protein is assembled. Surprisingly, the largest number of mutations are found in the introns. The cell does not waste time repairing mutations on the introns which have no effect on protein. Introns seem to provide radiation protection to DNA by reducing the likelihood that more sensitive parts of DNA can be damaged.

Natural Selection

The environment also acts as a filter to eliminate DNA changes. When altered DNA has an effect, the changes are almost always damaging so an individual with changed DNA is less fit to survive and reproduce. The environment constantly acts against such individuals and changed DNA information is constantly removed from the population. Before the advent of modern medicine, most human beings with diseases such as muscular dystrophy, haemophilia and cystic fibrosis would not have survived into adult life. Their damaged DNA was removed from the population, before it could be passed on.

Such selection also occurs in populations which possess the gene for sickle cell haemoglobin (SCH). This gene depends completely for its survival on there always being normal people (non SCH) around. Even though SCH individuals have higher resistance to malaria, their overall health is comparatively poor and will be selected against.

Stability of DNA and RNA

DNA strands are very stable. Some cells in the body which differentiate into specialist cells soon after birth, eg neurones (nerve cells) and skeletal muscle cells, exist without dividing for the term of your natural life. This means that they make no new copies of DNA and therefore use the same DNA for many decades. The DNA strands in the nerve cells of a 100 year old person have been there for 100 years. This stability is due to the very complex protective folding and packaging of the DNA strands, as well as around sixty different backup repair mechanisms.

RNA strands are not so long lived. Messenger RNA strands are very transient, having life spans ranging from minutes to hours. Some will remain intact for days but this is the exception. RNA has no known backup repair systems.

Passing on Mutations

Because DNA polymerase copies only what's on the DNA strand, any mutations which have not been repaired prior to replication will be copied. In bacteria, the observed mutation rate is approximately one mutation in every 10^5 or 10^6 replications. In a sexually reproducing organism only mutations on the DNA in an egg or sperm cell will be passed on to subsequent generations.

Could the bases A, T, C and G in DNA organise themselves into a code?

Because the bases in DNA attach to one another in a predictable base-pairs, ie A always to T and C always to G, it has been suggested that the bases could self organise into DNA code. However the bonding pair property of the bases merely enables the information to be copied accurately from one strand of DNA to another. Also, the type of bonding used to match the pairs across the DNA strands is not the only way the bases can combine. Thymine molecules can form strong bonds with each other. Therefore, if T can combine with A or T it would never be possible for the bases to self organise into a code.

The information is in the sequence of the bases along the strands, not in the base pairing across the strands. Although each base is connected to the complementary base on the opposite it is not connected to the bases on either side of it. Indeed if that happens, eg if two adjacent thymine molecules bond together (as described above), it disrupts the information copying processes. (See Damage Repair, p30)

We can see this when we consider the effects of mutations, ie changes in the DNA sequence. If one base is replaced by another in a sequence, next time that strand is copied the complementary base of the replacement base will be inserted in the new strand, not the complementary base of the original. The DNA has been accurately copied using the base pairing but original information remains lost.

New Evolution Theory

Many scientists have abandoned the idea of organisms gradually evolving by mutations slowly adding new information to DNA. They have proposed a new theory of evolution called ***punctuated equilibrium***. This theory states life forms are observed to be basically stable i.e. **in equilibrium.** Any evolution or changes have been sudden compared with Darwinian evolutions, i.e. the creature's stability or **equilibrium** has been **punctuated**.

Is there evidence for Equilibrium?

In Shark Bay, Western Australia, there are living algal mats called **Stromatolites**. In many parts of the world there are **fossil Stromatolites** which appear to be similar to living ones. Evolutionists claim fossil Stromatolites are among the oldest known fossils. Stromatolite DNA must have stayed the same (been in **equilibrium**) in order for living algal mats to still be similar to the oldest known fossil Stromatolites. Stromatolites with their obviously stable DNA are an excellent example of organisms in **equilibrium** which are producing their own kind.

Is there evidence DNA equilibrium can be Punctuated?

All observations on the effect of natural processes on DNA show that, at best, DNA stays the same, at worst it loses information over time. To date, there is no observed genetic mechanism which shows the obvious **equilibrium** of any known life form can be naturally **punctuated** to produce sudden evolutionary gains to DNA information. Would vast periods of time enable such punctuated evolution to be possible even though we have not observed it in the short term? To answer this we need to consider the effect on information which results from natural properties acting through time.

Time and Information

Consider the effects of natural processes on manufactured objects such as tables or cars. A wooden table left outside in the weather for a century or two will degenerate into a pile of compost. A car will become a heap of rust if subjected to the same treatment. In both cases the information used on the raw materials (wood or steel) by the manufacturers, and the energy used to create the table or car has been lost or dissipated. Any **Energy** or **Matter** supplied by the environment has only been destructive through **Time**.

$$\text{Table (Matter)} + \text{Energy} + \text{Time} \xrightarrow{\text{NP}} \text{Compost}$$

$$\text{Car (Matter)} + \text{Energy} + \text{Time} \xrightarrow{\text{NP}} \text{Rust}$$

Now consider the same process at work on living things. We all know that death is a fact of life. You get old and die. In a few centuries your body will be dust. All the DNA information in your cells and tissues will be lost.

$$\text{Body (Matter)} + \text{Energy} + \text{Time} \xrightarrow{\text{NP}} \text{Dust}$$

$$\text{DNA Information (M)} + \text{E} + \text{T} \xrightarrow{\text{NP}} \text{Loss of Information (mutation or decay)}$$

Every observed example where natural processes have changed DNA have ultimately produced a loss of information and a dissipation of Energy. To date there is not the slightest hint that anything natural can reverse this observed processes simply by being left longer.

This overall tendency to lose information and dissipate energy with time seems to be a basic **Natural Property** of the universe, which brings up an interesting thought.... **If the universe is observed to be losing information as well as dissipating energy as time goes on, what state was it in when it started?**

Would it have been perfect, i.e. filled with optimal information, with energy levels the best possible? Such a universe could not have been the result of the **Natural Properties** of the present universe which are dissipation of Energy and loss of Information. It could only be the result of a creation where **Information** had been supplied from **outside**.

COMING IN PART 5
We will consider if it is possible to scientifically recognise the results of a **CREATION**.

NOW COMPLETE WORKBOOK 4 PRIOR TO COMMENCING PART 5