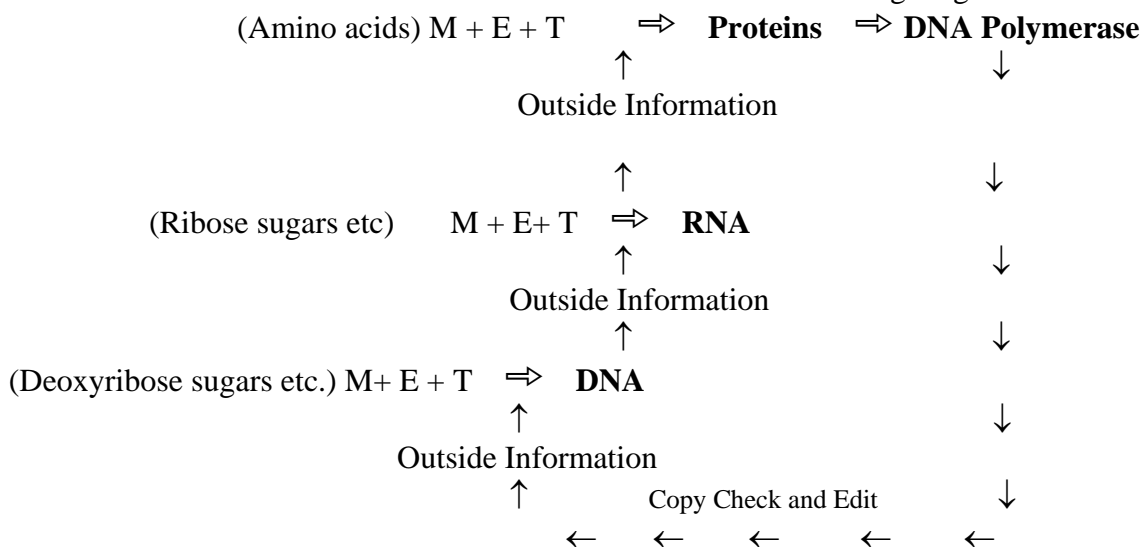


PART 3A REVISION AND EXPANSION of Part 2

So far we have seen:

1. Experiments such as Miller's suggested that **Natural Properties** of Matter + Energy + Time could spontaneously generate the **Amino Acids** which make up proteins, but...
2. Combinations of Matter + Energy + Time have produced 50/50 mixtures of left and right handed amino acids which must be separated by the supply of **Outside Information** to produce exclusively left handed amino acids found in the protein of living cells.
3. In the living cell the **Outside Information** to make proteins from only left handed amino acids comes from **RNA**.
4. Therefore proteins could not have been the first molecule to evolve spontaneously.
5. Some scientists therefore propose **RNA** was the first molecule to evolve. But **Spontaneous Generation** of RNA strikes the same problem as proteins. RNA contains only right handed Ribose sugars. Sugars produced by Natural Property experiments have been 50/50 LH/RH mixtures. **Outside Information** must be applied to the system to produce only right handed sugars.
6. Therefore RNA could not have been the first molecule to evolve spontaneously.
7. In the living cell the **Outside Information** to make RNA (using only right handed sugars) comes from **DNA**. No-one has suggested DNA was the first life molecule to evolve spontaneously because it is far too complicated.
8. **DNA** is the **master genetic code** which supplies information to the cell. DNA also copies itself to reproduce the life form. But DNA contains instructions for making **DNA polymerase** which functions as a copy check corrector to remove faulty copies of DNA during replication.
9. **DNA polymerase** is a protein coded for on DNA, but manufactured by RNA.
10. Information sources within the cell are summarised on the following diagram.



A system which functions as per the previous diagram, has one additional property: **such a system can only work if all parts are present and all parts work.**

11. Evolution can be summarised as:

(A) Matter (No life) + Energy + Time $\xrightarrow{\text{NP}}$ Life Form 1

(B) Life Form 1 + Matter + Energy + Time $\xrightarrow{\text{NP}}$ L₁ + L₂ + L₃ etc.

Within a life form, such as L₃, many variations may be produced by the **Natural Properties** of the system, ie

(C) Life Form 3 $\xrightarrow{\text{NP}}$ L_{3A} + L_{3B} + L_{3C} etc.

Formula (C) is how **Darwin** described the evolution of the different shaped **beaks** of the **finches** on the **Galapagos Islands**. He thought an ancestral finch from South America which already had a beak, somehow arrived in the Galapagos Islands and then evolved different shaped beaks. These new beak shapes, which enabled each variety of finch to survive in new environments, had been formed as a result of already existing **Natural Properties** of both the finch and the environment.

Most people assume that if the changes described in Darwin's beak theory (C) are true, then the evolution of all life from the first life forms described by (B) must be true, therefore, the **Spontaneous Generation** of life by **Natural Properties** described in (A), must also be true. But, we need to reign in our enthusiasm and remember, that the fact that each variety of finch has a beak shape which enables it to survive, in no way explains how beaks were originally formed and coded for in finch DNA, let alone how non living chemicals could become part of a living cell which could evolve into a finch. It's a good time to remind ourselves that: **the survival of the fittest never explains the arrival of the fittest!**

For General Evolutionary theory to be correct we need to be able to explain the following sequence of natural events leading to usefully shaped finch beaks:

Non living molecules $\xrightarrow{\text{NP}}$ Life Molecules $\xrightarrow{\text{NP}}$ Living Cells $\xrightarrow{\text{NP}}$ Amphibians $\xrightarrow{\text{NP}}$ Reptiles $\xrightarrow{\text{NP}}$ Birds
 (without cells) (without cells) (without beaks) (without scales) (without feathers) (with beaks scales & feathers)

The following changes to coded DNA information are required to achieve this:

No Code $\xrightarrow{\text{NP}}$ DNA Code $\xrightarrow{\text{NP}}$ DNA₁ $\xrightarrow{\text{NP}}$ DNA₂ $\xrightarrow{\text{NP}}$ DNA₃
 (No information) (Some information) (More information) (New information for beaks etc.)

Note that the **Information** contained on the **DNA** has not only evolved or changed, it has increased! It has gone from **Zero Information** in no code, to over **nineteen billion bits of Information** in the human DNA code.

CATCH 22 AGAIN

But for such general evolution to be true so that life forms have evolved from **NO DNA** code to all present known DNA codes, we are faced with the dilemma that **evolution is a process whereby naturalistic changes to the DNA code have produced a DNA coded to prevent naturalistic changes.**

How could this be?

To explore this problem we will consider the following questions:

- 1. What is information?**
- 2. What is a code?**
- 3. Once a DNA code exists, can the natural properties of the environment (Matter + Energy + Time) alter the DNA code information in a way that would enable evolution to be possible?**

PART 3B THE ORIGIN OF CODED INFORMATION

WHAT IS INFORMATION?

We (the authors of this course) are conveying information (to you the reader) by communicating through printed words. We are using **English code words** which are made from alphabetic letters which are only arrangements of slashes /, dashes -, and curves C. This brings to light an interesting property of **codes**.

The three lines / – \ are meaningless on their own, but they can be combined to form the letter **A** which is used to convey information in the English language. But what information is communicated by the **alphabet code A**?

English speaking Canadians are famous for using it as a noise at the end of a sentence - eh?

However, when **A** is written with another word such as “**A** horse” it has a specific meaning. It indicates there is one horse. We never say “**A** horses.” **A** is a letter which usually communicates the **Information ONE**.

When we add other code letters to A, do we add information?

One **N** added after **A** produces **AN** but what information is conveyed by **AN**?

AN is used with words like apple, which start with a vowel. Because if we say **A** *apple* it sounds like **A** *yapple* when spoken by most English speakers and nobody knows what yapples are. But since **AN** apple is only one apple, the **N** has not really added much more information. **AN** actually has the same meaning as **A**. **AN** communicates the **Information ONE** the same as **A** does.

Let’s add **D** after **AN** producing **AND** and ask what information is conveyed by **AND**?

Now we can join **A** *horse* **AND** **AN** *apple*, which indicates that at least two things are being talked about. When we add **D** to **AN** making **AND**, we automatically think two. Adding the **D** has changed the information. **AND** now communicates the **Information TWO**.

If we continue the process by adding an **R** we produce **RAND**.

What is a **RAND**? It is a gold coin from Africa. The **Information** is now completely different. Adding the **R** changes the meaning to gold coin (**RAND**) from the thought of two (**AND**). The word **RAND** does not look or sound like *gold* or *coin*. To understand the change we need to look into the history of the word which, if our sources are correct, seems to have been as follows.

Centuries ago in Ancient Europe **RAND** meant a leather strip. Later it came to mean a strip of land along the edge of a field. Then it came to mean the edge of a river and later still a ridge on the edge. In South Africa gold is often found in ridges and coins are made from gold. It seems somehow a link was made in the human mind and a gold coin from Africa came to be called a **RAND**. The word **RAND**, and the information conveyed by it, was invented by, is stored in, and transmitted by the human brain.

Human word codes like **A**, **AN**, **AND** and **RAND** have been created by man. They contain only the meaning or information given to them by man. The meaning or **Information** is not a **Natural Property** of the parts or letters which make them up. This is the reason words can change meaning with time eg. Jumper in the USA means a person who jumps; jumper in Australia is a jacket you wear. It's also the reason people put different meanings on the same sounds. The farmer hears 'lettuce spray', the clergyman hears 'let us pray'. Funny, isn't it.

Consider another example: Look at the block letter symbol \square Now rotate it 90 degrees anticlockwise. It becomes \sqcap . Now rotate it another 90 degrees anticlockwise, it becomes \sqcup . Put them together and you read $\sqcap \square \sqcup$. We did not use 3 different code symbols. It was the one code shape to which our mind gave 3 different meanings when we rotated it. You are more used to seeing these code symbols as **M** + **E** + **W** so let's put the letters together to make the word **MEW**, then ask, what animal comes to mind when you see the word **MEW**? Most people say cat!

Why cat? **MEW** does not look like a cat or resemble the word *cat*. Cats do not spell **MEW** when they make a sound, and a more literal English spelling of a cat's sound would be **MEOW**. How do we get from **MEW** to **cat**? Your brain accepts the code letters **M**, **E**, **W** and is stimulated by the leading question about an animal to eventually find the closest approximation - **MEOW** which brings with it a memory of cats. It is the mind which accepts, contains and processes any **Information** communicated by the **code word MEW**.

Where is the Information in a code?

Can you translate this code? • • • - - - • • • Most people know it's Morse Code for SOS.

Morse Code was made of dots and dashes organised by a man named Morse, who applied **Outside Information**, Energy and Time to the Matter (dots and dashes) in order to create the code.

Matter (dots + dashes) + Energy + Time \xrightarrow{OI} Morse code

The importance of Morse's **Outside Information** shows when we ask - "Why does • • • mean S?" Why not • • - or - • - or - • •? The answer - Morse decided it would - like it or lump it! Morse created the code and gave meaning to the symbols. It's been passed down ever since. Three dots in a horizontal line actually have no natural meaning at all. It shows when you rotate them.

-
- Three vertical dots are the same symbol sideways - but they do not communicate a sideways **S**.
- The information transmitted by the three horizontal dots has come from the **OUTSIDE**. **S** is not a **Natural Property** of the three dots. It has been put on to the symbols by Morse.

Outside Information has always been needed to produce codes and teach them to others. We see this in the number symbols we use.

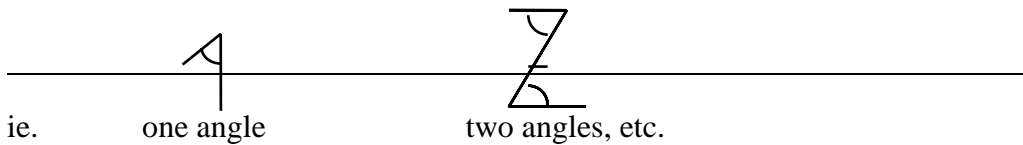
NUMERIC CODE


Someone in the past took straight lines and arranged them to form the original number symbols.

Matter(- + \ + | + /) + Energy + Time \xrightarrow{OI}

These original symbols were clearly constructed to convey correct information about which number they referred to. The information was stored in the number of included angles in each symbol.

1 2 3 4 5 6 7 8 9



Clever, wasn't it? But numbers don't look like the originals any more. Present day numbers are usually written 1 2 3 4 5 6 7 8 9. What has happened to the numeric code? As some lazy students (who became lazy teachers), wrote them down they lost their precise shape.  (six) became 6. The information ie. the correct number of included angles disappeared. However, the information was preserved because they still resembled the shape which people's minds associated with the original number code. Today you could never work out the meaning of the numbers from how the symbols are presently written. The included angle information is no longer there. This means the number code can only be understood when teachers force students to remember what the symbols are supposed to mean. They give you the **Information** from **outside**.

We could describe what has happened to the numeric code as:

Original Numeric Code + Not So Energetic Students + Time ^{NP} → Modern Number Code

This represents a **loss of information** from the actual code, but it does not mean the code has become useless. The symbols still serve a purpose for their creator. An edit-correct system in the mind has approximated the degenerate shapes with the originals and passed the **now fully arbitrary information** to another mind. Centuries later we can still use the symbols in a meaningful way. But the mind now supplies all the **Outside Information** to the code.

Supposing the present form of number symbols was left carved in stone somewhere and then forgotten by everyone. Discovered centuries later someone may recognise the symbols had been deliberately carved, but would not be able to find any meaning for them without the help of **Outside Information** such as a history book. Look up the history of the **Rosetta Stone** to see how true this was in trying to decode the secrets of Ancient Egyptian Hieroglyphics. The information in codes always comes from outside the code itself.

The **Information** conveyed by a code is not a **Natural Property** of the **parts** (the symbols) which make up the code. This can also be seen when we use the same symbol to mean different things. For example a vertical straight line, **l**, could be used to indicate the number "one," a lower case version of the letter "L," or a version of the letter "I". Remember the children's mystery code puzzle books with sentences like **llll** (which meant: one eye ill).

Single Step Codes

All the above codes involve only one step, i.e. the sight of the symbol **6** suggests an immediate and related meaning - **the number six**. The efficiency of a single step code is related to how complete it is. The original number system was of limited use when it only included symbols 1 to 9. (Try writing or counting to one thousand if you only have numbers one to nine.) The numbering code became far more efficient when zero was created and the system could go from one to ten, to hundreds and thousands much more efficiently.

Multi-Step Codes

Codes which involve more than one step are referred to as multi-step. They have often been popular in the spy business. An example:

Step 1. The spy receives an innocent message in English, i.e. "Fred said".

Step 2. The spy knows it has to be converted to Hebrew letters.

Step 3. Because Hebrew letters also have a numerical value, the spy then adds up the value of each group of letters to produce two numbers.

Step 4. The first number tells the spy the chapter to read in the Spy Manual. The second number tells which paragraph to read for the message from headquarters.

It is easy to decide what will happen to such a complex multi-step system if one step is missing. No-one would be able to find out what the final message was, which leads to the following conclusion: **in a multi-step code system all steps must be present or no step will work!**

Lets summarise what has been discovered about codes created by man:

1. All such codes have involved the application of **Outside Information**.
2. The **Information (I)** conveyed by the **PRODUCT(P)** code, is not due to any **Natural Properties** of the **parts(p)** which make up the code.
3. The **Information** in a created code is in the arrangement of the parts, therefore there is more Information in the completed **PRODUCT** code than in the symbols or **parts** of the code, ie. **I (P) > I (p)**.
4. The symbols used in a created code are totally arbitrary.
5. Single step code systems are inefficient until completed.
6. In a multi-step code system, all steps must be present or no step will work.
7. There are no observed examples where Matter + Energy + Time under the influence of **Natural Properties** has resulted in a code.
8. Once a code has been created, the **Natural Properties** of the system have been observed to produce loss of information, but never a gain of information.

Back to DNA

The **DNA** code consists of four chemicals called bases - **Thymine, Adenine, Cytosine** and **Guanine**, usually written **T, A, C,** and **G**. These are firstly arranged in triplets, eg ATC, GAT, and then the triplets are arranged in ordered sequence. The information of the DNA is stored in this arrangement of triplets of bases. The chemistry of A,T,C and G are well known as is the reason why A bonds with T, and C with G, but no known natural property of A, T, G, or C has been able to explain the coded information properties of DNA. The coded information transmitted by DNA is not due to the natural property of its parts T, A, C, or G. To date, no one has been able to find any reason why T, A, C, or G mean anything either singularly or in combination.

No part of DNA coding functions independently of the living system it is part of, and no part of the DNA/RNA/protein information transfer system can survive and function unless all parts of the cell system work. The properties of the DNA code are similar to those of multi-step human codes which we know were created.

COMING IN PART 4

After the DNA has been correctly replicated by the **DNA polymerase**, there are still occasions when DNA information can be altered **naturally**. When this happens, the DNA change is usually referred to as a **mutation**. Could changes to the DNA code caused by **mutations** account for the evolution of the different life forms after DNA was already present on earth?

NOW COMPLETE WORKBOOK 3 PRIOR TO COMMENCING PART 4.