Advances in Social Sciences and Management
September 2023, Vol-1, No-9, pp. 65-88

Unified Theory of Life – A Critical Review of Literature

Takeo R. M. Nakagawa

1. Think Tank Flow, 2-14, Meiko, Hakusan 920-2152 Japan

Abstract:
This paper is concerned with the unified theory of life based on the critical review for the existing literatures, which had unlocked the secret of life designed by the God. This theory concludes that life for an initial single couple of female and male is created by the God, but the subsequent numeral replications of DNA are able to result in a variety of species in each the kingdom, where each the kingdom is believed to be created spontaneously. It is realized that this work plays a decisive role in criticizing Darwin's theory of evolution, in which he has tentatively proposed that every creature had been evolved from a mono-cell through natural selection and mutation over 3.8 billion years. Currently, his theory remains only a speculation with neither any evidence nor fossil supporting his theory. On the contrary, there are already ample evidences supporting replication mechanisms of DNA that must be created by the God's intelligent design.

Keywords: Genetics, Origin of Life, DNA, Evolution Theory, Intelligent Design

INTRODUCTION

In biblical times, under the god Jacob gave birth to spotted and/or speckled offspring. In plants, pollen covering the stamen fall on the stigma to give seeds and then flowers, whose detailed structures may be seen in Figs. 1 and 2. In seventeenth century, the micro-scope was invented by Zacharias Jansen, and was leading to the discovery of sex cells. In flower, sex cells belong to ovary, ovule and egg together with stamen and stigma as shown in Fig. 2. But, in sex cells for the human, homunculi (tiny human) had never been observed in them. Non the less, Nehemiah Grew had speculated that plants and animals were contrivances of the same wisdom given by the God. Once, it was also considered that heredity is transmitted by blood rather than genes. In the mid-eighteenth century, Erasmus Darwin convinced that any species would adopt to its surroundings. Whereas, Iean Lamarck proposed the coherent theory of evolution as acquired characteristics are inherited to some extent.

Fig.1: Flower of fringed pink, Dianthus, which means holy flower being symbol of elegant Japanese lady.

Family: Nadeshiko, Genus: Dianthus.
Note that the central stigma being surrounded by eight stamens. Bases of the petals in pink color are bundled at the center, while each of the petals is formed as blurred triangle, and the outer edge is fringed.

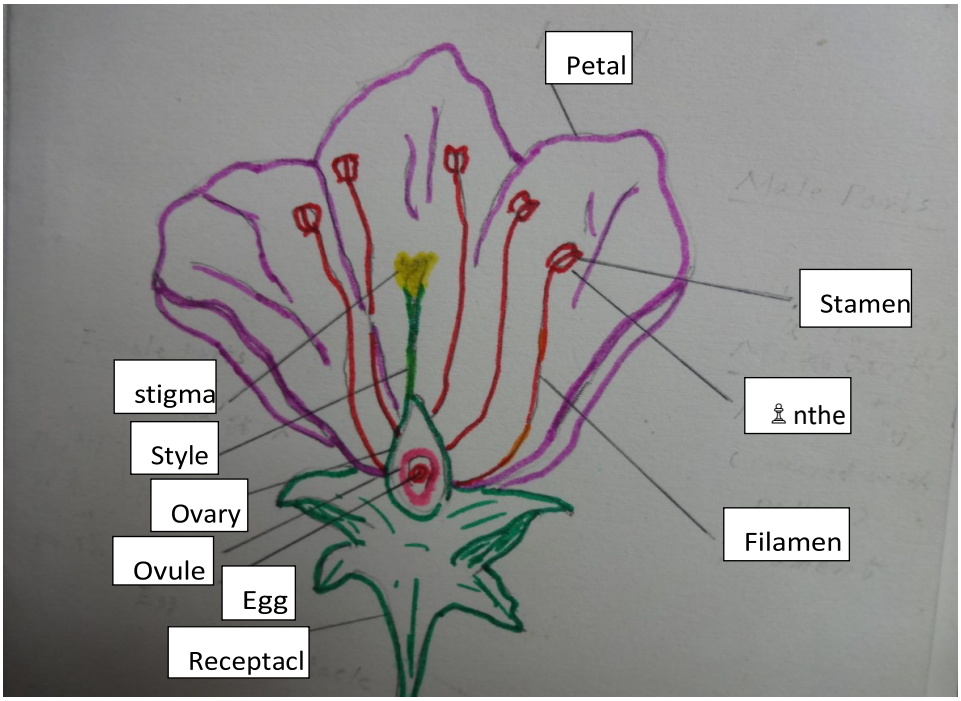

Fig. 2: A brief Sketch of the structure of flower.

Gregor Mendel had reached at the conclusion that each character of parent plant of edible peas is determined by two genes. In 1859, on the basis of observation during his voyage from 1831 to 1836 Charles Darwin hypothesized that hereditary characteristics would be evolved only by natural selection and/or mutation.

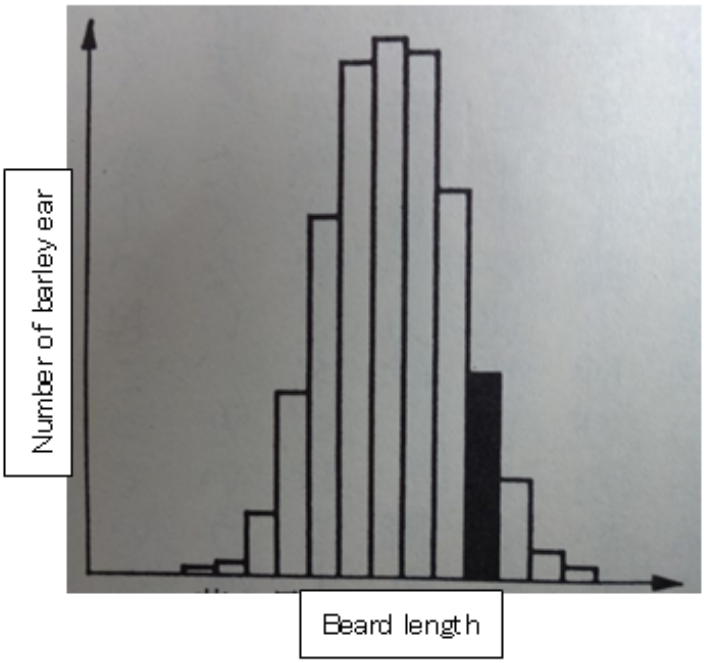

Fig. 3: Number of barley ear against beard length.

The black column is one part, number of which seeds will be planted for experiment subsequently. After Schrödinger (1944).

Fig. 3 shows the number of barley ear against the beard length. Darwin had proposed that natural selection enhanced by a series of the tiny but continual mutation enhances to increase the beard length of barley. It is therefore expected that all of the columns in this figure would move to the right, for the average length of the beard attaching to the barley ears must increase. Thus, planting the seeds of the barley belonging to the black column in the garden, and after growing them up, the number of barley ear for each beard length are counted as before, but the result is the same as the previous experiments. It is, therefore, considered that this is one of the counter evidences on Darwin's theory of evolution.

In 1869, Fredrich Mischer obtained pure nuclei from the composition of white blood cells by adding it hydrochloric acid solution, and then DNA (deoxyribonucleic acid) finally by adding the nuclei alkali. Ten years later, Walter Fleming found that analine dyes imparted DNA color. As early as 1870s, Oskar Hertwig discovered that during fertilization the sperm penetrated the egg, in such a way that the nuclei of the sperm fuse with those of the egg. Edouard van Beneden noticed that the sperm and the egg both contribute the same number of chromosomes per cell, which varies according to the species. The nuclei of the sperm and that of the egg both contained equal number of chromosomes, and so its number should be doubled during fertilization. But unexpectedly, Beneden noticed that the chromosome number remains constant, maintaining the characteristic number for each of the species: It is called "meiosis" in Greek. Meiosis was explained by Fleming, who explained clearly that instead of merging, the encountered two chromosomes split length-wise into two identical halves. After being scattered in the cell, one half of chromosome for the sperm merged with that for the egg, while the other half of chromosome for the sperm merged with that for the egg.

In 1911, Thomas H. Morgan realized that genes could be mapped. Just over a decade later, he had extended this map to include the relative positions of over 2000 genes on Drosophila's four chromosomes, where Drosophila is called "Shojyobae" in Japanese. Herman Müller discovered that when the flies are irradiated with X-rays, they produce mutations at ca. 150 times their normal rate.

In 1920, when Fred Griffths injected mice with either noninfectious rough cells or noninfectious heat-killed smooth cells, the mice naturally remained unaffected. But if he injected the mice with living rough cells and heat-killed smooth cells, the mice were infected. When he examined these mice, he found that they contained infectious smooth cells:

Something in the dead cells might have caused this curious transformation in the living ones. Oswald A very set about trying to isolate this transforming principle, and by 1944 he had shown that it was caused by DNA, which contained four bases, viz. adenine, thymine, guanine and cytosine as shown by P.A.T. Levene. These were arranged in varying order along a linking structure, carrying equal amounts of the four bases. Proteins in the chromosomes were carriers of genetic information.

DNA had a backbone consisting of sugar molecules(deoxyribose), linked by a bond of phosphodiester. Attached to each sugar molecule was one of the four bases. Using the latest purification technique, Edwin Chargaff managed to isolate the four bases. By the early 1950s, he

had found that they were not exactly equal. Representing the four bases as A, T, G, and C symbolically, he had proposed the following rules, being essential in analysis of DNA: A+G=T+C, A=T and G=C

In 1953, at last James Watson and Francis Crick had unlocked God's secret of life, and how it had passed from generation to generation since 3.8 billion.

The main purpose of the present study is to propose a unified theory of life, by reviewing critically existing literatures which had contributed to reveal the secret of life.

DAWN OF GENETICS

References to genetics go back as far as biblical time: According to genesis, Jacob had a method for making sure that his sheep and goats gave birth to spotted and speckled offspring. More realistically, the Babylonians understand how palm become fruitful, and pollen covering anther at the stamen have to be introduced to the stigma at first, and then it is transported to style, and become the egg through ovary and ovule, where the pistil is consisting of the three parts, viz. stigma, style and ovary, as depicted in Fig.2.

The ancient Greek philosophers were the first to look at the world in a recognizably scientific fashion. Aristotle's observations led him to conclude that the male and female do not make equal contributions to their offspring: The female and the male give "matter", and "motion", respectively.

Genetics in biology crossed the threshold into science in the seventeenth century. This was almost entirely due to the micro-scope, which was invented by the Dutch lens-grinder and counterfeiter, Zacharias Jansen in the early 1600s. Microscopes led to the discovery of the cell. The discovery of sex cells (or germ cells) caused great excitement. Soon after several microscopists enthusiastically convinced that they had observed "homunculi" (tiny human forms) inside the cells, once it looked as if the problem of reproduction was solved entirely. More importantly, the English botanist, Nehemiah Grew speculated that plants and animals were "contrivances of the same wisdom", being created by the God. He suggested that plants too have sexual organs and exhibit sexual behavior.

For centuries, it had been widely accepted that heredity was transmitted by "blood". This is the reason why such a commonplace expression is known as "blood line" (血脈 in Japanese). But this was not only rough, but inadequate: How could the same parents having their common "blood" mixed produced different offspring? Also, what accounted for the appearance of characteristics not present in either parent, although sometimes seen in long-dead ancestors and distant relatives? For instance, in thoroughbred racehorse breeding, piebald has been known to recur after a gap of dozens of generations.

By the mid-eighteenth century the scientists had at last started speculating along lines that were obvious to any racehorse breeder. One of the early developers of this idea was the eighteenth-century philosopher-poet-scientist Erasmus Darwin, who is father of the famous Charles.

Erasmus was convinced that species were capable of change in such a way that any specie with "lust, hunger and/or a desire for security" would organically adopt to its surroundings. On one hand, the French naturalist Jean Lamarck came up with the first coherent theory of evolution.

Lamarck had been born in 1744, the son of a broke aristo. By the age of thirty-seven he had become Botanist to the King. When the Revolution took place, Louis XVI was executed, along with any blood line who could be found. But Lamarck quickly evolved a suitable social cover, and emerged as Professor of Zoology at Paris.

According to Lamarck, "acquired characteristics are inherited." In other words, a man who has learned how to become a skillful fencer will pass on this skill to his son. This sounds fairly plausible-especially when one considers the Bach family. However, the fault in the "acquired characteristics" theory is demonstrated by a more extreme example: Even after generations of being blinded at birth to work in coal mines, pit ponies were still not born blind. Nevertheless, not long after Lamarck died, the idea of evolution gradually became more widespread.

MODERN GENETICS

Gregor Mendel was born in 1822 in Silesia, which was then part of Austro-Hungarian Empire. His parents were peasants and so he was forced to abandon his university studies because he had no money. In order to continue his education, he entered the priesthood, where he taught him-self science yet failed his simple teaching exams. Allegedly this was because of" examination amnesia, "though the fact that he scored lowest marks in biology, speaks of some more profound resistance to systemized knowledge.

Despite this, it was in systemization that Mendel showed his genius. Mendel ended up at a monastery just outside Bruno, which is now Czech Republic. Put to work in the monastery garden, he began a long and systematic series of experiments crossbreeding edible pea plants, Mendel studied seven different characteristics of the plants, such as flower color, height, seed shapes and so on.

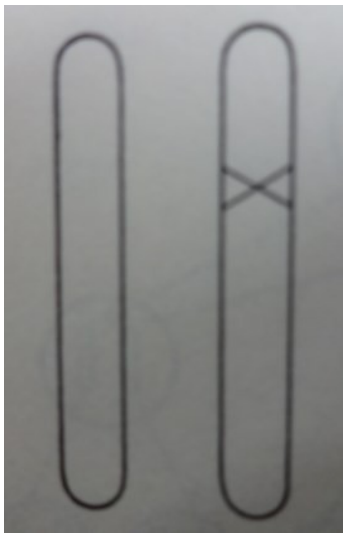

Fig. 4: Heterozygote mutant.

Symbol x denotes a pair of the gene, where the half is muted.

Fig.4 depicts a pair of the gene, where one half is muted, but the rest half is normal.

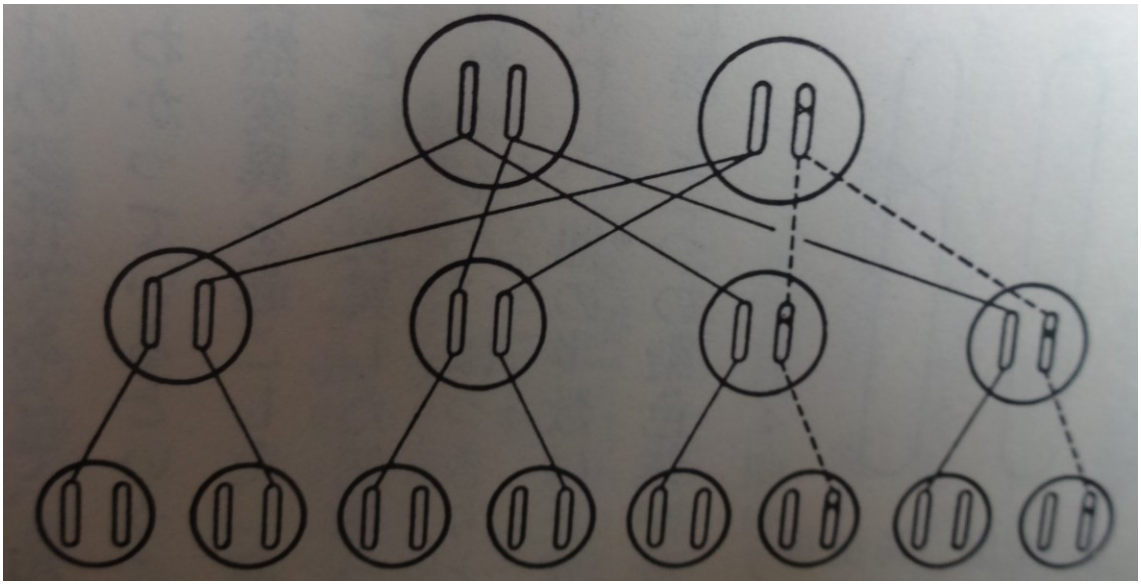

Fig. 5: Inheritance way of mutation, representing the well-known Mendel's law

Solid line denotes the transformation of normal chromosome, while the broken line denotes that of mutant chromosome. Note that eight pairs of chromosomes with no line are originating from the respective spouse in the second generation, where all of the chromosomes due to the spouse are normal.

Fig.5 shows the inheritance way of mutation. As the results of the hybrid in the first generation, only the four chromosomes would be produced in the second generation, where all of these chromosomes are normal though the two pairs include mutant chromosome in half. This happens because the normal chromosome is dominant against the mutant one. It is interesting to note that in the third generation 3/4 of the chromosomes is normal, while 1/4 is mutant, so that Mendel's law is demonstrated in the present discussion.

Referring to Mendel's paper in 1859 when those of the first hybrids in generation were crossed with each other, they produced 75 % tall plants and 25 % short plants.

Mendel concluded that each character was determined by two "genes", one contributed by each parent plant. For instance, the characteristic of height was determined by a "tallness" gene and a "shortness" gene, respectively. Those two genes remained in the plants. If they did not blend, they retained their separate identities-but one was dominant. In this case, the "tallness" gene was dominant. This explained why when the plants were initially crossed, their hybrid offspring were all tall in the second generation, but when the resulting hybrids were crossed again, the "tallness and "shortness" genes were spilt and reformed in the third generation. Each parent contributes one gene to each offspring, producing four possible combinations: This accounted for the 75%:25% distribution of tall plants and short plants after the second crossing, as shown Fig. 5.

It looks as if genes held the key to heredity. After conducting over twenty thousand experiments. Mendel came to further conclusions. Firstly, plants inherited equal number of genes from each parent. Also, separated pairs of genes always paired up again independently of one another. He further suggested that these genes were transmitted by germ cells.

Mendel had indicated why certain observable characteristics such as pie-baldness in horses could skip generations, and why children of the same parents do not exhibit the same characteristics. This is because the independent pairing of the separated genes results in a variety of combinations through several generations.

Mendel had written a paper on his work entitled "Experiments with Plant Hybrids" ("Versuch über Pflanzenhybriden" in German). He published this historical paper in the local magazine, the Natural Science Society at Bruno (Mendel 1970). These conclusions are now known as Mendel's Laws, which are the foundation of modern genetics.

However, not until 1900 did Mendel's work come to light! Only then, 34 years after the publication of his original paper, did he receive the universal acclaim.

Mendel had conclusively disproved the "blood" theory of heredity, which implied that the characteristics of parents are blended in their offspring. Even, Charles Darwin, however, believed that heredity was transmitted by the blood. Fortunately, Darwin's work in the theory of evolution was to prove more lasting (Darwin 1858). The publication of his book, entitled "The Origin of Species" introduced the idea of "the survival of the fittest." Darwin had tentatively speculated on the basis of his observations during the circum-voyage on the Beagle during 1831~36 that species evolved only by natural selection and mutation. Despite this, the French Lamarckists continued to believe in the inheritance of acquired characteristics after being born. According to them, the giraffe had grown its long neck as a result of generations continually stretching for eating high leaves. But the Lamarck's theory was conclusively disproved in the 1890s by the Cerman biologist, August Weismann, who must have been deeply impressed by nursery rhymes in his childhood: Evoking scenes from "Three Blind Mice", he conducted experiments in which he amputated the tails of mice for several generations. Despite this grim practice, the mice's tails neither disappeared nor became shorter.

Concerning other persistent myth, the blood theory, was finally laid to rest by Darwin's cousin Francis Galton: In another series of unfeeling but apparently vital experiments, he transfused blood from white rabbits into black rabbits. The rabbits might be expected to be turned green in color, but in fact the transfusions had no effect. After the black rabbits were well enough to resume their normal activities, it was found that none of their numerous progenies had white fur. It is certain that heredity is transmitted by neither blood, nor natural selection and/or mutation, but only genes.

In his book in 1859, Charles Darwin himself could not have explained rationally what happened to hereditary characteristics, to be inherited from generation to generation by natural selection as well as mutation: In fact, they still remained a mystery in life: August Weismann and Francis Galton had conclusively demonstrated that what happened at the cell level, but Charles Darwin merely proposed unrealistic hypotheses, which were no relevant to genes at all.

Meanwhile, advances had been made in a field which appeared to have little relevance to genetics. In 1869, the 24 years old Swiss biochemist, Fredrich Miescher was researching at Tübingen into the composition of white blood cells. By adding these cells hydrochloric acid solution, he was able to obtain pure nuclei, and then by adding the solution alkali, he got acid. In the process, he obtained a gray precipitate being quite different from any previously known

organic substance, "nuclein"-since it was part of the nucleus. This is we now know as DNA (deoxyribonucleic acid).

Ten years later, the German pioneer of cell structure research, Walther Flemming, began using the newly discovered analine dyes to stain the nuclei of cells. He discovered that these dyes imparted color to a bandlike structure within the nucleus, named "chromatin". Then, it was realized that chromatin is the same as nuclein, chromosome and/or DNA after all. In fact, DNA is the same what makes up the genes discovered by Mendel.

As early as 1870s, the Germa biologist Oskar Hertwig had made an important discovery while studying sea urchins under the newly developed light microscope. During fertilization the sperm penetrated the egg, and the nuclei of the sperm fused with that of the egg. On one hand, the Belgian embryologist, Edouard van Beneden found that the sperm and the egg both contributed the same number of chromosomes in the fertilization process. He also discovered that there is a constant number of chromosomes per cell, which varies according to the species. For example, the human cell contains a total of 46 chromosomes.

But if the nuclei of the sperm and that of the egg both contained equal number of chromosomes, and both contributed to equal number chromosomes, it was expected initially that the number of chromosomes should be doubled during fertilization. Beneden, however, confirmed that this did not happen actually. Instead of the chromosome number being doubled, the characteristic number for each of the species is sustained the same. This process, by which the number of chromosomes halves in the germ cells (formed by the sperm and the egg), Beneden named "meiosis," in Greek, or "to decrease" in English. Meiosis was eventually explained by Fleming, who noticed that instead of merging directly, the two chromosomes split lengthwise into two identical halves. These scattered through the cell, and then one half of the first chromosome merged with the other half of the second chromosome, while the rest half of the first chromosome merged with the rest half of the second chromosome. Here, at cell level, was a process which posed an uncanny resemblance to the splitting of genes described by Mendel.

During the early years of the twentieth century, the American experimenter Thomas Hunt Morgan became aware of this resemblance. He undertook an exhaustive series of experiments breeding fruit flies. These flies have a life cycle of just fourteen days, allowing for rapid statistical work. Despite encountering discrepancies with Mendel's findings, which were nothing to do with Mendel's occasional fudging, Morgan was eventually convinced that Mendel had been on the right track.

Extending Mendel's work on genes, Morgan showed that Drosophila had four groups of linked genes. The fact that some genes frequently remained together from generation to generation suggested a characteristic linking mechanism. Morgan found that they could only be joined together on chromosomes. As there were four groups of genes, he concluded that Drosophila had four chromosomes. The assortment of Drosophila characters did not follow Mendel's laws. This could be accounted for by the splitting and recombining of chromosomes observed already by Flemming. The splitting allowed some genes on the same chromosome to reassort, whereas other remained linked. Their normal time is meant that genes at a greater distance from one another on the chromosome were more likely to reassort. And the higher the frequency of reassortment, the further apart the genes. Morgan realized that genes could be mapped.

In 1911, Morgan produced the first chromosome map, indicating the relative location of five sex-linked genes. Just over a decade later, he had extended this map to include the relative positions of over 2000 genes on Drosophila's four chromosomes. They began to move faster when one of Morgan's students discovered a method of increasing the mutation rate of Drosophila. Hermann Müller discovered that when the flies were irradiated with X- rays, they produced mutations at 150 times their normal rate. They also produced mutations which didn't occur in nature. Weird hybrids with deformed wings and misshapen sexual organs began to appear. This led Müller to conclude that X-ray caused a reaction between chemicals in the genes. Discoveries in this field were those of life itself or intelligent design due to the superintendent of universe, say the God. They revealed how it passed from generation to generation, and how it changed. These discoveries had no relevance to the evolution theory proposed by Charls Darwin in principle. That is, in heredity natural selection contributes only to minor change during the growth of fauna and flora, while mutation must be controlled entirely by the replication mechanism for DNA.

At that stage, the possibility of isolating the gene remained remote: All those scientists could observe were only the faint dim shadow of the chromosome. However, Müller's demonstration of how to increase mutation meant that the gene's properties could now be extensively analyzed. Heredity was transformed by chemical reaction, and the gene- bearing chromosome was found to contain a number of different proteins and nucleic acids. Either one, or a combination of these, was evidently the carrier of genetic information. The proteins were the obvious choice, as they had a more diverse structure, and thus appeared capable of carrying more information.

But this conjecture was disproved as a result of experiments carried out by two bacteriologists working on either side of the Atlantic. Back in the 1920s in London, Fred Griffiths had carried out experiments on pneumocci, the bacteria which causes pneumonia. Under the microscope, the surface of a colony of pneumocci cells appeared shiny and smooth when they were infectious, but when they were noninfectious the surface of the colony appeared rough. If the smooth infectious pnemocci were heated, they were killed, becoming rough and noninfectious.

When Griffiths injected mice with either noninfectious rough cells or noninfectious heat- killed smooth cells, the mice naturally remained unaffected. But if he injected the mice with living rough cells and heat-killed smooth cells, the mice were infected. When he examined these mice, he found that they contained infectious smooth cells. These had evidently reconstituted from a mixture of the two injected cells. Something in the dead cells had caused this transformation in the living ones. A nonliving constituent of the smooth cells was evidently capable of combining with element of the rough cells. It was inherited by the next generation of cells. Curiously enough, some nonliving chemical had transferred and altered the living gene.

On the other hand, in New York, USA, bacteriologist, Oswald A very working at the Rockefeller Institute, set about trying to isolate the transformer. By 1944, he had shown that it was deoxyribonucleic acid, known as DNA.

By this stage, considerable progress had been made on the analysis of DNA. The Russian-born chemist P.A.T. Levene had shown that DNA contained four bases: adenine, thymine, guanine and cytosine. These were arranged in varying order along a linking structure, carrying equal amounts of the four bases, as shown in Fig.6, but their detailed structure was not known at all in those days.

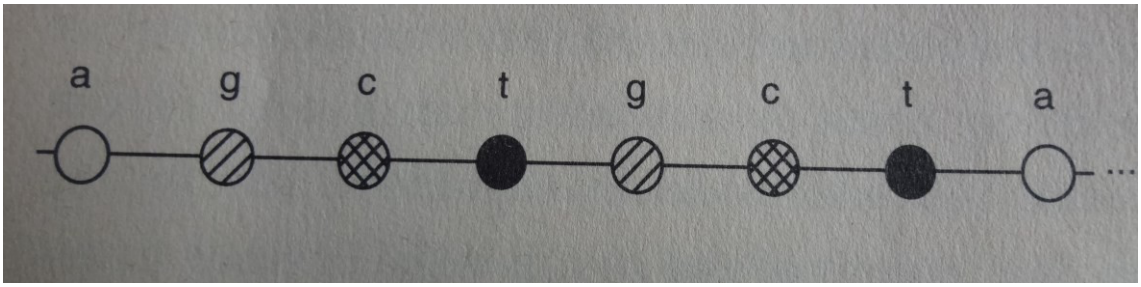

Fig. 6: Four bases, viz. a(adenine), t(thymine) g(guanine), and c(cytosine)in DNA arranged in varying order along a linking structure.

Proteins in the chromosomes were the carriers of genetic information. This view has been exploded by the findings of his colleague A very, which identified DNA as the transformer. Further analysis by Levene revealed that the nucleic acids had a much more complex structure, than had originally been thought. DNA had a "backbone" consisting of sugar molecules (deoxyribose), linked by a bond of phosphodiester. Attached to each sugar molecule was one of the four bases. Such a molecule was very large, and was evidently capable of carrying genetic information.

At nearby Columbia University in New York, the Czech chemist, Erwin Chargaff immediately embarked upon the study of DNA further. Using quantitative analysis, he discovered that different species each appeared to have their own characteristic DNA. Using the latest purification techniques, he managed to isolate the four nitrogenous bases: adenine, thymine, guanine and cytosine. By the early 1950s, he had found that contrary to previous belief, these four bases were not in fact precisely equal. Representing the bases as

A, T, G, and C, he found that:
A+G=T+C, (1) and that:
A=T and G=C (2)

It is known now that relations (1) and (2) are "Ghargaff's rules", which are essential in the analysis of DNA.

However, the fundamental question about DNA still remained. How did this "transforming principle" actually work? In other words, how was the genetic information carried and conveyed? This was ultimate secret contained in DNA: The secret of life itself, and how it passed on from one generation to the next. To understand this question, it is necessary to unlock the detailed structure of DNA.

UNLOCKING TO SECRET OF LIFE

Francis Crick was born in Northampton in 1916, the son of a local shoe factory owner. He won a scholarship to Mill Hill, a small public school in the suburbs of London, and afterward studied at University College, London. Here he was taught the great scientific advances which had been taken place at the turn of the century.

Filled with belief in his own abilities, Crick applied to do research and was quickly allotted a task appropriate to the prevailing view of his character and abilities. After the war, Crick prepared to return to his research. In 1946, he attended a lecture by the American Linus Pauling, generally recognized as the finest chemist of the century. This awakened Crick to the possibilities of chemical research. Around the same time, he also read What Is Life? (Schrödinger 1944), which

was written by the Austrian physicist, Erwin Schrödinger, one of the founders of quantum mechanics. This book suggested how physics, most notably quantum mechanics, was applicable directly to genetics in order to clarify mysteries of life.

Organic molecules, the chemistry of genetics, quantum mechanics-this heady cocktail of research possibilities soon replaced the old theory of evolution due to Charles Darwin et al about 100 years ago. In 1947, Crick registered for research in Cambridge. Here he set about acquainting himself with the biological side of biological physics. Two years later, he was moved on by the Cambridge Medical Research Council Unit at the world-famous Cavendish physics laboratory. Thus, at the somewhat mature age of 33 years old, Crick began his first real research work. A couple of years later, a young American called James Watson arrived at Cavendish. He had been born in 1928 in Chicago. At the age of fifteen, Watson was enrolled at the University of Chicago to study zoology. He wasn't keen on this subject, but his real interest was in ornithology.

At the age of nineteen, Watson graduated and went on to the University of Indiana at Bloomingdale. Here he was affected by two crucial events: He also read Schrödinger's What Is Life? This book had a profound effect to his research. The young genius, Watson acquainted with the gene for the first time, and he knew at once that this was his very subject. The second influential event in Watson's life at this point was studying with the microbiologist Salvador Luria, who had fled to America from Mussolini's Italy. Luria was a founder of the Phage Group, consisting of leading geneticists investigating self-replication at the viral level. Viruses were thought to be a kind of naked gene, and the simplest viruses are bacteriophages. Luria was making important advances in this field, using X-ray irradiation.

Schrödinger had shown Watson the direction of his research, while Luria showed him how to go about it. Watson launched into a doctoral thesis on phages, with Lauria as his supervisor. Watson followed his mentor's advice with enthusiasm and embarked on a go- it-yourself chemistry course. In 1950, Watson received a fellowship from the Merck Foundation, to study bacterial metabolism in Copenhagen under the supervision of the biochemist Herman Kalckar. On an icy spring day in Copenhagen, the emotionally unbalanced biochemist and his non-chemist assistant set off for the sunny Mediterranean. This seaside break at the Merck Foundation's expense was to prove the most fortuitous inspiration of Watson's scientific life. Here, Watson met the thirty-three-years-old New Zealander Maurice Wilkins, who was based at King's College, London. Wilkins had been a high-flying physicist, and during war had worked in California on the Manhattan Project, which created the first atomic bomb. The result had left him disillusioned with physics, and so after the war he had become interested in molecular biology. On returning to Britain, Wilkins had joined the Medical Research Council's biophysics unit at King's College. Here, he had begun taking X-ray diffraction pictures of DNA. He had even brought one of these with him to Naples, and he showed it to Watson. Wilkin's photo depicted a somewhat blurred geometric pattern, whose significance had to be pointed out by him to Watson. In a flash lite a thunder storm, Watson got to understand that this was exactly what he had been looking for, for this must be the only way to discover the detailed structure of DNA. Despite knowing even less about X-ray diffraction than he did about chemistry, Watson bravely wrote to the Merck Foundation demanding a transfer to the Cavendish Laboratory in Cambridge, where the Medical Research Council had another X-ray diffraction unit. With the megalomaniac vision of youth, Watson had now seen precisely what he wanted to do! He had strong confidence that he could unlock the secret of life designed by the God, by discovering the structure of DNA. This was

Watson's ambition in pure and simple. A few days after his twenty-third birthday the quiet, seemingly shy young Watson entered the Cavendish Laboratory in Cambridge.

It wasn't long before that he met up with the owner of the famous laugh. The rapport with the thirty-five-years-old crick was instantaneous. Crick appeared equally impressed by Watson. Cavendish in Cambridge, along with King's College in London, were cutting edge of X-ray diffraction. Cavendish had already once changed the face of science. Several decades earlier Ernest Rutherford (1871-1937), a pioneering researcher in both atomic and nuclear physics, the greatest experimentalist since Michael Faraday (1791-1867), and his colleagues had founded nuclear physics, bringing this new science to fruition with a miraculous burst of creativity at Cavendish during the 1930s. Now it was the turn of molecular biology largely due to X-ray crystallography, which was the technique that had enabled human vision to extend beyond the range of light: No matter how powerful a microscope is constructed, it can only see objects larger than the wavelength of light, while X-rays are a form of electromagnetic radiation having a wavelength of 5,000 to 10,000 times shorter than the wavelength of light, which itself has a wavelength of 10-4 cm. This makes the wavelength of X-rays comparable in size to the distance between atoms in crystals! The principle why X-ray diffraction can reveal the structure of crystal may be described in such a way that once a fine beam of X-rays is passed through a crystal, the beam is diffracted by the atoms in the crystal, and thus shows a complex pattern depending on the structures. In turn, by examining the photograph for the diffraction pattern, we can know the structure to some extent at least. This process may appear relatively simple at the first glance, but in fact it involves a host of excruciating exact and sophisticated techniques. These involve such tasks as positioning, refining and isolating the individual crystals, as well as attempting the deduction of highly complex molecular structures from dim patterns.

The X-ray crystallography unit at Cavendish was led by the Viennese-born biologist Max Perutz, who had left Austria in 1936. For several years Perutz's formidable experimental abilities assisted by Bragg's equally formidable theoretical skills, had been devoted to determining the structure of hemoglobin, the protein of red blood cells. By 1951, they were at last beginning to achieve some success.

But Perutz and his team were not the only ones interested in the structure of hemoglobin. The fifty-years-old master Linus Pauling was also trying to work out the structure of complex biomolecules including hemoglobin. Working from his base at Cal-Tech, he had already deduced a model structure for proteins involving a helix-a spiral of molecules much like a corkscrew! He suggested that this might be the form of DNA. In 1951, working from old pre-war X-ray diffraction plates, he went to publish a suggested structure of DNA, involving three coiled helices. At Cavendish, Crick and Watson studied Pauling's suggestion, but remained unconvinced.

Meanwhile things were also progressing at Wilkin's X-ray crystallography unit in King's Collage, London. Unlike our two free spirits, Crick and Watson at Cavendish, this was where the actual work on DNA was supposed to be going on: Cavendish and King's had a gentlemen's agreement in such a way that protein was Perutz's ball, whereas DNA was Wilkin's. Non the less Crick and Watson were far interested in DNA by now to worry about sustaining the agreement as ordinary people.

In King's College, Wilkins had by this stage been joined by the twenty-nine-years-old Rosalind Franklin, who had just completed four years of X-ray diffraction work in Paris, and was very much state-of-the-art in the new field. Franklin's arrival should have been a lucky stroke for Wilkins.

When much of the water was withdrawn from DNA, its structure exhibited orderly, repetitive, quasi-crystalline qualities, which proved amenable to X-ray crystallography. This water-reduced form was known as "A-form" DNA, and was the sort initially used at King's College, London. Franklin had made significant progress by November 1951. She had worked out a new method of reintroducing water to the A-form DNA. After rehydration the structure of the DNA was transformed. The differences showed up in X- ray diffraction patterns.

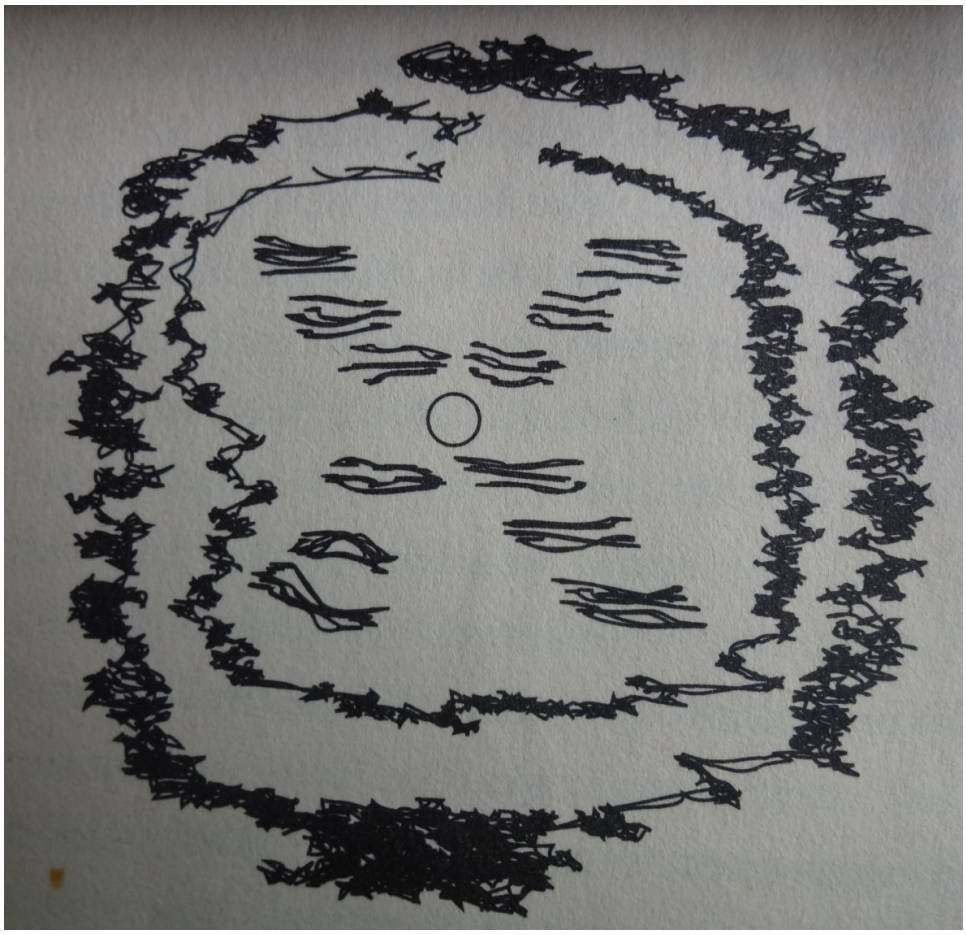

Fig. 7: DNA picture, blurred resembling a film of a spinning four-blade propeller, taken by Frankline in 1951.

Franklin had managed to obtain some of the best pictures so far. Fig.7 is one of her best pictures, but it is too blurred to identify the detailed structure of DNA. Because these remained very blurred, resembling a fil of a spinning four-blade propeller, she could not find whether DNA is straight or helical. However, after measuring the angles and patterns that could be deduced from the photographic plates, Franklin began a mathematical analysis of her results. Then Franklin decided to make public her findings at a seminar in King's. There Watson learned that Franklin's results seemed to confirm that DNA was helical. In her view, DNA consisted of anything from two or four interlaced helical chains, where each helix had a phosphate-sugar backbone, with attached bases, adenine, thymine, guanine and cytosine, much as Levene had suggested. But importantly,

it looked as if the bases were attached to the inside of helix, forming links between the helical chains.

As part of his new regime of thinking about DNA, eventually Crick became deeply involved in a conversation with John Griffiths, a young mathematics postgraduate. John happened to be a nephew of Fred Griffiths, whose 1920s experiments on rough and smooth pneumocci had inspired A very to prove DNA the genetic carrier. This link was not entirely coincidental: John Griffiths had a hunch that certain problem of DNA could best be resolved by mathematics, and had already done a few preliminary calculations using known data about the four bases. As ever, Crick was soon discussing the fundamental problems in the structure of DNA with John. Crick believed that any structure for DNA should account for or at least allow for replication-the process by which it passed on its genetic information with no end. In fact, Crick imagined that this must somehow involve the coded sequence of four bases, which now seemed to be stacked on the inside of entwined helices. John Griffiths immediately passed on to Crick some result of calculations that he had done concerning the four bases-adenine(A), thymine(T), guanine(G), and cytosine(C). John Griffiths had worked out which of the bases were attracted to one another in a way A is attracted T while G is attracted C. In a spark of supreme inspiration, Crick saw that this could be the crucial point to DNA's replication. Crick suddenly imagined after the helical strands parted, they must become the templates for the formation of complementary strands precisely similar to the ones from which they had parted. This was indeed a giant leap of the imagination on Crick's behalf. Another bonus of John Griffiths' base attracting combination was that it at once accounted for Chargaff's rules (1) and (2). At King's, Frankline had made spectacular advances in X-ray diffraction technique, and these now convinced her that DNA was not a helical structure after all! On one hand, at Cavendish, Watson now completed his work on TMV (tobacco mosaic virus), one of the main components of which was nucleic acid. In fact, its nucleic acid content was a variant on DNA called RNA that could provide a vital clue to DNA.

Despite Franklin's bombshell, Watson went on insisting that DNA must be helical, based on the X-ray diffraction pictures taken by Frankline herself. One glance on her X-ray diffraction pictures, Crick had realized that Frankline's non-helical theory rested on her misinterpretation, for though the pictures did not certainly show the radial symmetry necessary for helices, this was merely due to overlapping patterns of crystals. At this moment, Crick's was a brilliant and daring conjecture-which had the added advantage of agreement with what he thought was the case exactly!

Other opinions were not so easily dispensed with, however. In July 1952 Chargaff himself arrived in Cambridge. Crick and Watson badgered John Kendrew, Perutz's brilliant assistant, into arranging a meeting with Chargaff. In the autumn of 1952, Watson became friend with Linus Pauling's son Peter, who had arrived at Cavendish to do postgraduate research. Peter Pauling was invited to share Watson and Crick's office, and was soon enthusiastically joining in their conversations.

One day, Peter Pauling informed Crick and Watson that he had received a letter from his father, who would put together a paper outlining its structure, and had promised to send Peter an advance copy. Peter Pauling duly received a copy of his father's paper. After reading it, he passed it on to Crick and Watson. They read that Peter's father had come up with a structure containing three helically entwined chains with the sugar phosphate backbone outside the coil. This was uncannily similar to the one which Crick and Watson had shown to Franklin and Wilkins on their disastrous day trip to Cambridge-except that Pauling had paid a little more attention to work out

the details, and matching these to X-ray evidences. With the obstinacy of youth, Watson settled down to check the precise details of Linus Pauling's structure-the chemical bonds, the figures, the location of key atoms. Unbelievably, Pauling had omitted to give the phosphate groups, which formed the links in each chain, and any ionization as well. This meant there was no electric charge to hold together the long thin chains. Without these they would simply unravel and fall apart. Worse still, without this ionization the model which Linus Pauling had proposed for this nucleic acid wasn't even an acid. After telling anyone in Cambridge who would listen, Watson set off on the train to London. Though Franklin remained Watson that there wasn't the slightest evidence to support a helical structure for DNA, Wilkins went to so far as to show Watson some of Franklin's latest X-ray work. This was truly amazing for Watson. Franklin managed to obtain X-ray diffraction pictures of an entirely new form of DNA. This B-form, as it became known, occurred when the DNA molecules were surrounded by large amounts of water. This resulted in X-ray diffraction patterns of astonishing clarity and simplicity. In Watson's view, it was unbelievable that Franklin was still sticking to her non-helical theory, for the A- form DNA evidence was ambiguous, but this new B-form left no doubt whatsoever. In fact, the amazing clarity pointed to even more exciting conclusions. Sitting in the freezing railway carriage on the return journey to Cambridge, Watson excitedly began making sketches and calculations on a blank at the edge of his ragged newspaper. By the time, he went to bed that night, he had reached a novel conclusion that DNA consisted of two interwoven helical strands, which has been believed as one of the most important secrets among the God's creations in ever known.

STRUCTURES OF DNA

Next morning, the machine shop downstairs at Cavendish was put into immediate production of metal plate, in shape and scale-size corresponding to the four bases. In no time, Crick and Watson set about building up a scale model, fitting together the intricate structure of two interlinking helical chains of molecules unlocked by themselves just yesterday. Fig. 8 depicts a brief sketch of the DNA molecule proposed by Watson and Crick in 1953.

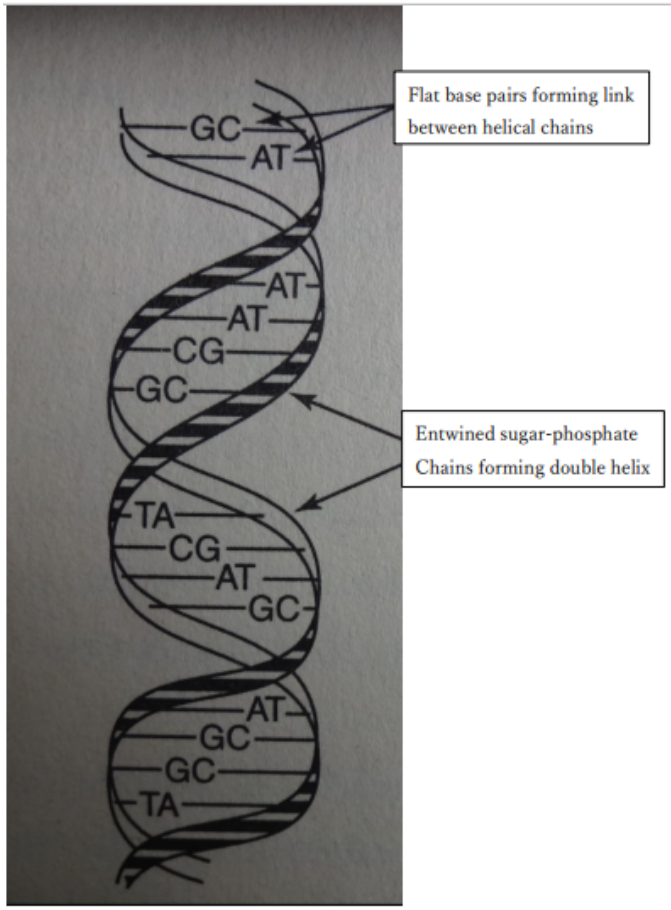

Fig. 8: A sketch of the DNA molecule proposed by Watson and Crick in 1953. This resemblesa spiral staircase with the base pairs AT and GC forming the steps.

Fig.9 is a brief sketch for explaining DNA replication mechanism, which was clarified by Watson and Crick 1953. Everything had to be built up from the basic building blocks of the known chemical contents of the complex DNA molecule. The size of each of the individual molecules which combined to form this complex molecule, and the lengths and angles of helical bonds between them, all had to be taken into account as precisely as possible.

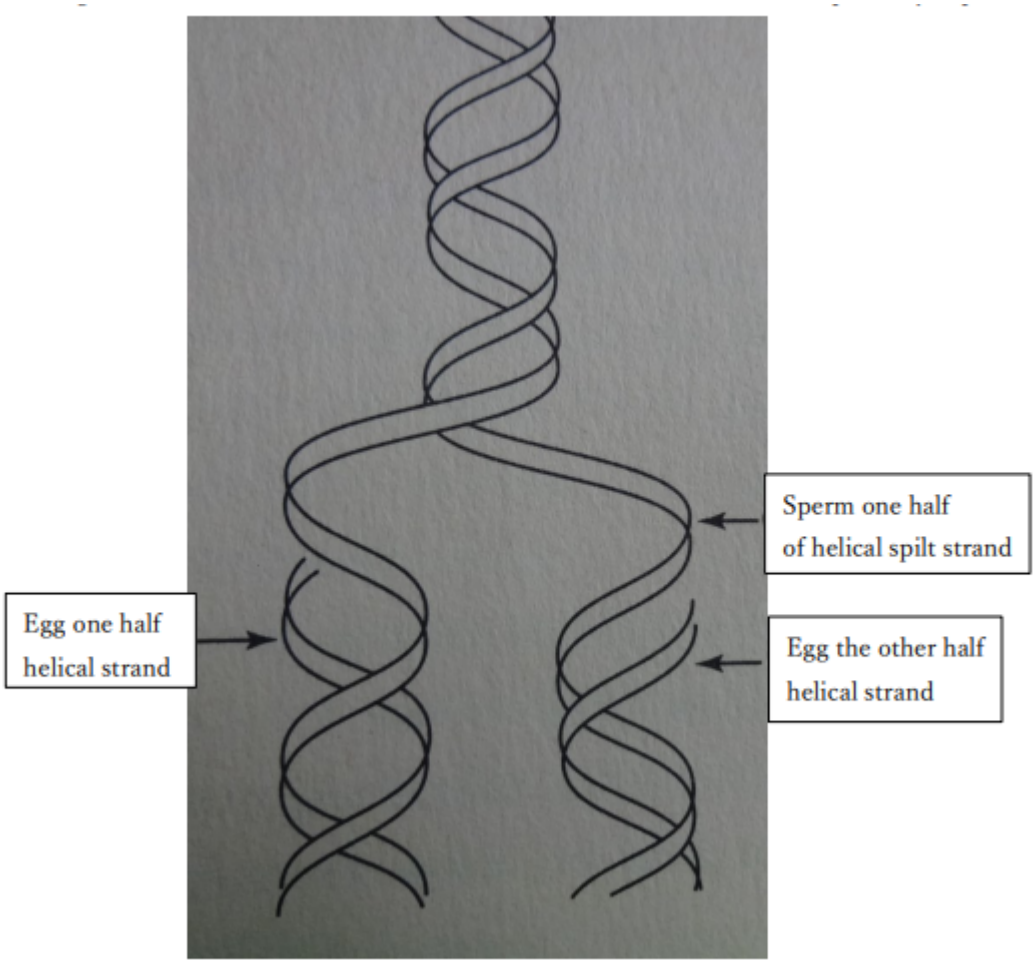

Fig. 9a: DNA replication mechanism, which was clarified by Watson and Crick 1953.

An idea of the sheer mind-boggling complexity of this task is given by the following analogy: Imagine a couple of combs, both two meters in length, with uneven teeth sticking out at odd angles. These combs must both be twisted into corkscrews, and then intertwined, so that each tooth on one comb meets up with the complimentary tooth of the other comb. But before even beginning, it is necessary to calculate the exact length, position and angle of each individual tooth of each comb. Fig.10 shows the three geometrical data for DNA acquired from the pictures taken by Frankline (Sayre 2000).

An idea of the scale involved is given by the fact that the combined coiled width of the two combs is ca.1.6 nanometer, where one nanometer is 10-9meters, in other words one billionth part of a meter.

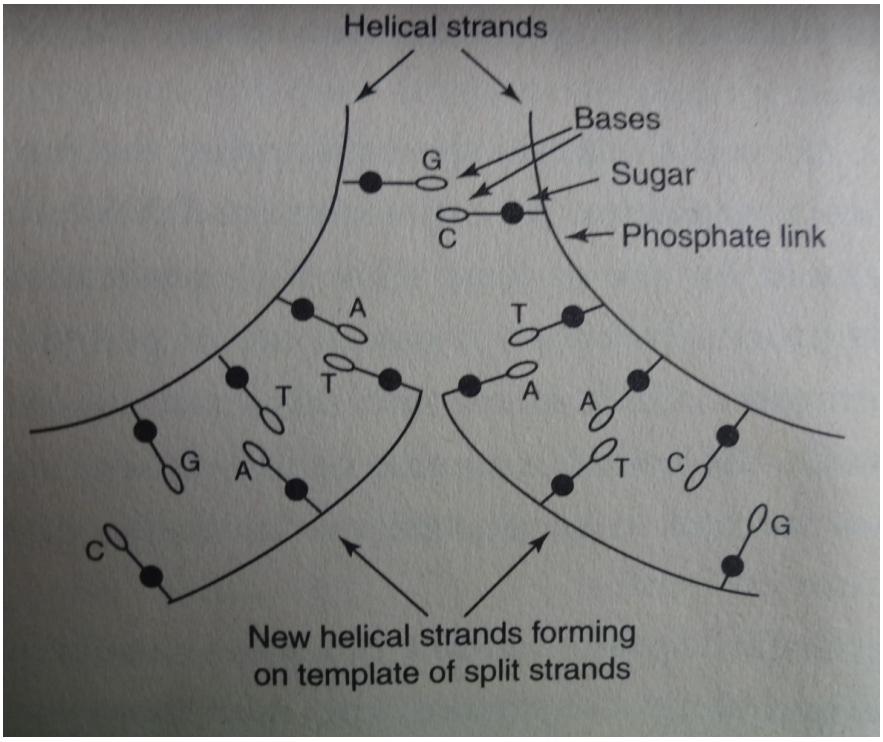

Fig. 9b: DNA replication mechanism with detailed explanation. After Strathern (1997)

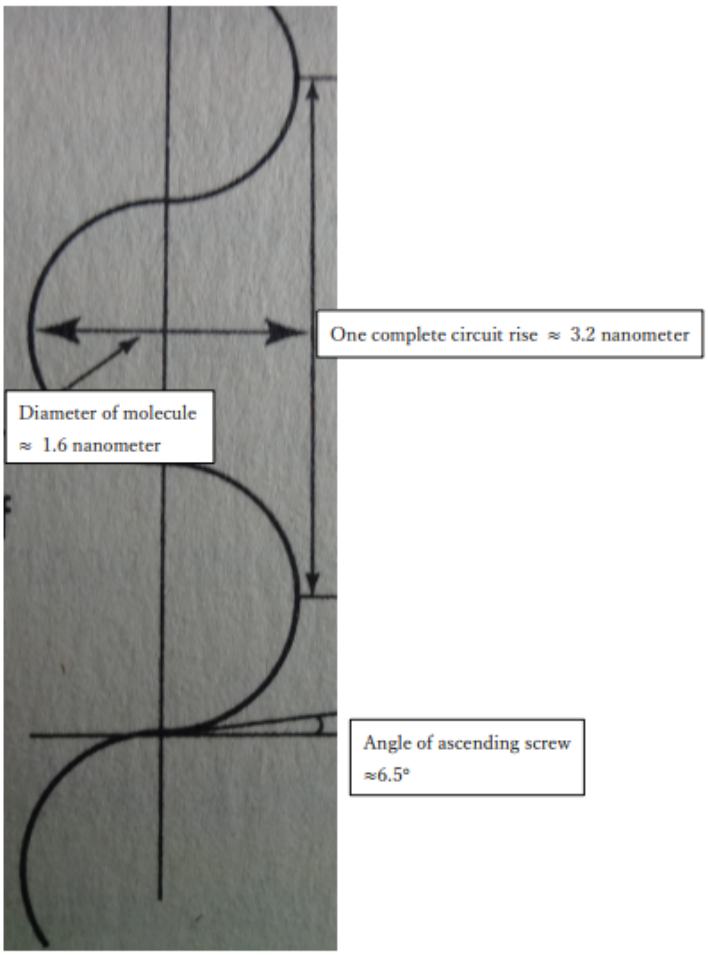

Fig. 10: Three geometrical data for structure of DNA, gained from X-ray diffraction pictures by Franklin et al. After Strathern (1999)

Crick and Watson had already put considerable thought into these matters. But other features had to be accommodated naturally too. An important another factor was the precise twist of each helical chain of molecules-whether it was coiled closely like a spring, or more openly like a spiral staircase. Watson had surmised from Frankline's X-ray diffraction pictures of B-form DNA that the structure was a double helix, but her data also provided a few even more essential clues. For instance, it was possible to gauge from the patterns on the X-ray plates, the exact diameter of the molecule is ca. 1.6 nanometers. The angle of the ascending "screws" of the helices and how far they rose in a complete "circuit" could also be calculated with a much greater degree of certainty.

The bases had to be on the inside, though each base had a molecular formula which allowed for two different molecular structures-the enol form and the keto form. After trial and error in many times, Watson finally discovered that only when the keto-form base pairs joined A-T and G-C, just as Griffiths had suggested, they did fit inside the chain. And this meant that either pair could occur anywhere in the chain, thus allowing for a vast permutation of pairs. At last, they'd discovered the key to the structure of DNA. On March 7, 1953, just five weeks after they had started building, Crick and Watson proudly unveiled their model to their colleagues at Cavendish. On April 25, 1953, Watson and Crick published a paper in Nature, entitled "Molecular Structure of Nucleic Acids." In just nine hundred words with a simple diagram. Some scientists were to be less charitable about Crick and Watson's unscrupulous use of material from King's X-ray diffraction unit. According to their view, Crick and Watson had no right to claim for themselves the credit for this momentous discovery. In fact, such views were taken into account by the Nobel Committee. In 1962, the Nobel Prize for Medicine was awarded jointly to Crick, Watson and Wilkins, but Rosalind Franklin had died of cancer four years previously at the age of thirty-seven sadly. To emphasize the joint nature of DNA's discovery, and the assistance given to Crick and Watson by colleagues at Cavendish, the Nobel Prize for Chemistry in the same year was awarded to the head of the Cavendish X-ray diffraction unit, Max Perutz and his colleague John Kendrew.

DISCUSSION

It is not sufficient for us to bring our offspring even if we have accepted how genes are transmitted from generation to generation: At start, either male or female at least must arise his/her sexual desire. Then, they must do the sexual intercourse successfully in such a way the sperms and eggs may be ejàculáted timely, and so are mixed each other properly to form a matching pair. This makes an egg being released one per month possible to fertilize a sperm among many candidates, say several hundred million per ejàculátion. But it is said that 99 % of those sperms would die before arriving at ovary through fallopian tube. At this stage, neither the female nor the male is possible to choose its respective opponent, but is obliged to leave the final decision to the God! It seems to be strange that though the God provides us the sexual desire, but does not give us the right of final decision to choose the opponent when we fertilize with each other. That is, the God must not provide us full of freedom to get offspring, but only its portion, say 5%.

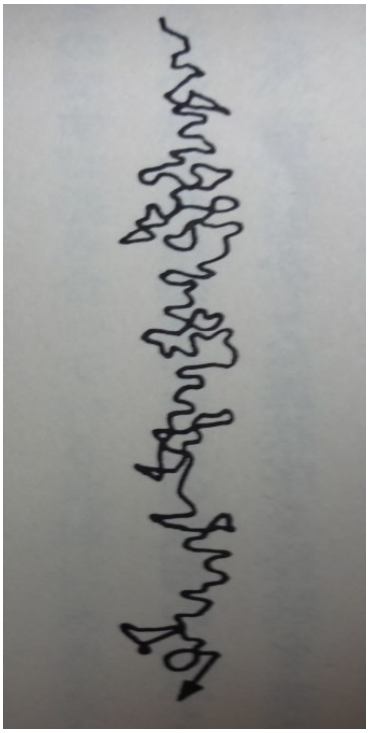

Fig. 11: Random walk of mist particles in the air, where the direction of the gravity is vertically downwards.

The falling velocity of each the particle may depend on viscosity of the air, scale and specific weight of the particle, temperature distribution, and/or air turbulence.

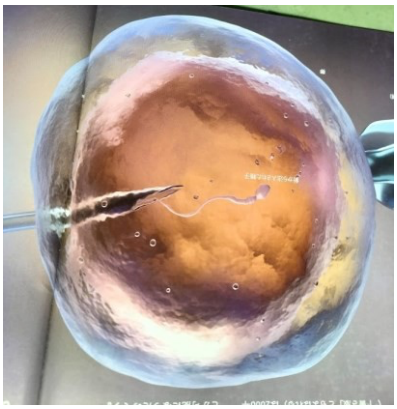

Fig.12: Microscope-fertilization.

One sperm is injected into the egg while observing with a microscope, where it is injected through the needle tube from left into the egg, so the sperm is swimming in the center of egg held firmly by the pipet on the right. After Itakura (2023).

In this connection, it may be worth noting to remember such a belief that the God had created human beings by expecting us becoming like the God with clear intention, but left us a certain freedom for activity how we should live on the earth.

This might even make us difficult to some extent, for the God had created us almost perfect but with original sin, which has been known over 2000 years as the famous story in the old Bible concerning the illicit love between the chief angel, Lucifer and the first God's daughter Eva, and

the subsequent illicit love between Eva and the first God's son Adam at the garden of Eden. Christians may believe that we are equipped with the original sin, for we are considered to be descendants of Adam and Eva. However, it may be no question we are saved from original sin or evil heart.

However, it is realized that ca. 5% freedom given by the God is an essential factor of our life, for it would make our life worth living if it is used properly: It is because that our daily study, training, education, and/or research effort would make possible to overcome the evil heart due to the original sin, for example. Hence, it may be the ultimate goal of our life that we could overcome the original sin in terms of ca. 5% freedom given by the God. It may be evident that if the God have created us perfect, we must have nothing to do in our life, so we all might be boring and so we are even not worth living.

Before finishing the present discussion, we may be worth seeking for the reason why the God had provided us sense of the sexual desire to every opposite sex rather than a single beloved opponent. This is an essential issue that must be solved, for so-called the adultery is mainly caused by such a sexual desire: We cannot often control the evil mind longing for an adultery properly. In the peace time, family would be sometime broken up owing to the adulty, whereas in the war time, many women would be raped by the enemies. It is worth noting here that apart from human beings, there remains a question whether each couple of animals and/or plants fertilize after considering or scrutinizing the opponent or not. For example, has any stamen the right to choose or reject the opponent stigma, and vice versa? If not, how could the God control the rate of their fertilization properly for each of species?

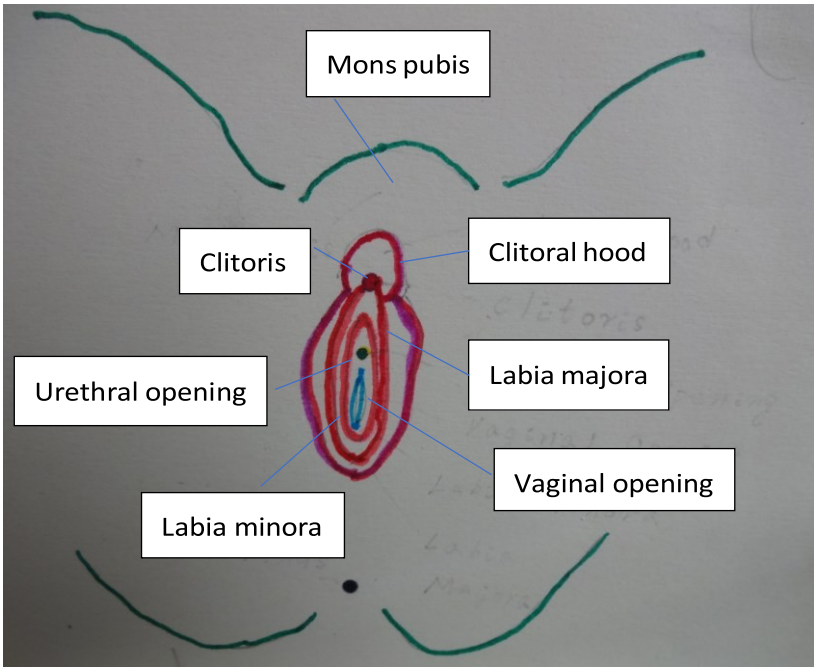

Fig.13: A sketch of the vagina anatomy for female.

Fig.13 depicts a detailed drawing of the vagina for female. Now let us consider why the God have brought in an ultimate pleasure to the couple during sexual intercourse, for without such a magical pleasure it might not be possible for our human kingdom to survive until the present time since dawn of our history over the last 3.8 billion years on the earth.

As far as the present author is aware of, a male may be sometimes attracted by a female, and vice versa. Upon encountering to such a counter sex, and if either the female or a male feels affirmative impression, she/he seems to get certain effect on her/his sexual organ. More directly, referring to Fig.13, as soon as she takes off her clothes and show her naked body, his pennis erects naturally preparing to insert it into her vaginal opening. While, her vagina may react in such a way that some viscous liquid would be oozed out and the inside surface may be covered with it entirely, if she gets affirmative feeling against him in particular. At the same time, her labia minora as well as labia majora might be uncovered to show him the vaginal opening clearly. In addition, her clitoris at the mins pubis that is located just above the urethral opening, swells shining in a pink after the clitoral hood is uncovered. In the whole processes to finish up their intercourse successfully, various delicate senses such as sight, touch, pain, hearing, and/or smell might take part in, and play the important role in enhancing our holly activities, which must be designed by the God undoubtedly.

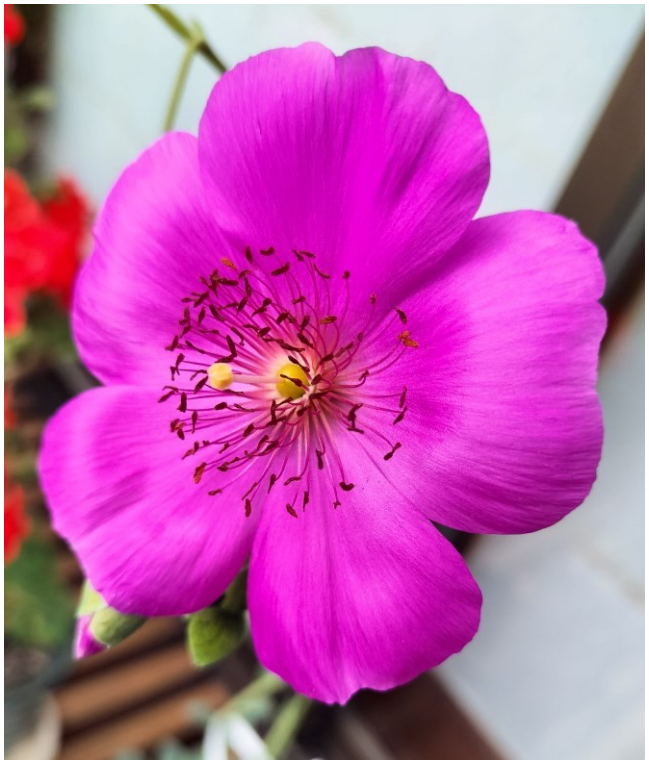

Fig. 14: Andes pine needle peony to explain how flower fertilizes offspring.

Fig.14 is an Andes pine needle peony to explain how flower fertilizes offspring., but it equips the same function as human being essentially: In the center, stigma, being surrounded by many stamens, for example. It is realized that the exactly same tactics are used by the flower to bring out seeds, or offspring. This suggests us immediately that both of human being and flower have been designed by the God, for if not it is unlikely that these tactics are common.

Considering these complex but extremely elegant designs to transfer the inheritance information from generation to generation unlimitedly, there is no question to think such a great work could be done only by the God, who is superintendent of the universe.

CONCLUDING REMARKS

In this section, new findings and insights that have been obtained through the present study are summarized.

There may be no question to consider that DNA is designed and created by the God in order to duplicate each of our lives, together with fauna and flora. Over 3.8 billion years, a number of kingdoms for creatures had appeared spontaneously from time to time owing to the God's designs. Accordingly, any type of individual for each kingdom had been formed by the duplication process of DNA, but not by the natural selection and mutation.

Darwin's theory of evolution must, therefore, abandoned completely, for this is only useful for considering some minor change and/or modification appearing by training or practice after offspring.

As the result of the discovery of the structure of DNA by Watson and Crick, we human beings know how to play the role of the God in constructing the DNA structure for any type of individual in principle: Perhaps sooner than we think, we might be able to do this. For example, we could certainly eliminate a few diseases. Also, we could produce exceptional individuals- another Newton say, a Picasso, a Curie, a Hawking, or the next Einstein. Then, once we can make one, we can clone it, though individuality might cease to exist. It is suggested that an important task of scientists is to disclose the secret of life created by the God, who is the designer for all of livings existed in the universe.

It is certain to say that the evolution theory proposed by Charles Darwin, Jean Lamarck and others, as well as the blood theory are trivial, for heredity on life is transmitted by genes in principle, but not by these theories: Adaptation to natural environment, and/or blood would result in only minor change in each creature. Of course, mutation provide us important role in life, but again its effect must appear only through the unusual change in DNA, which will be transferred through it subsequently.

Finally, all of the human beings originate in the first couple, say Adam and Eva, created by the God, so we all are sisters and brothers, for we are sharing DNA with each other to some extent. This means that we are relatives not only with all our ancestors, but also all people living at the present time as well as those appearing in future forever.

It is, therefore, evident that the initial DNA given by the God is immortal, and thus it may be possible to consider that each of us is also immortal. It is suggested that there is a great and promising hope for us to attain the world peace by realizing the holly truth concerning the concept of permanent of the initial DNA, which is common among all of us. The war among the sisters and brothers must be against the God's will, for we all have been created by divine intervention being loved equally.

ACKNOWLEDGEMENTS

The author is grateful for late Professor Dr. Shunichi Tsugé and Dr. John Hinwood for their permanent encouragement to promote the author' s scientific activities.

REFERENCES

Darwin C.R. (1859) On the Origin of Species by means of natural Selection, J. Murray, London, Reprint of the 1976 issue of the 1968 edition published by Penguin Books, Baltimore with new introduction, pp. 459

Itakura, R. (2023) Graphic Science Magazine: Newton, vol.3, 22-23(In Japanese)

Mendel, G. (1970) Versuch über Pflanzenhybriden. Viewweg+Teubner Verlag, Wiesbaden, pp.112

Olby R.C. (2012) The Path to the Double Helix: The discovery of DNA, Dover, Reprint Edition, pp.560

Sayre, A. (2000) Rosalind Franklin and DNA. Norton, pp.221

Schrödinger, E. (1944) What is Life? -The Physical Aspect of the Living Cell. Cambridge University Press, Cambridge, The Japanese Edition in 2008 (translated by S. Oka and Y. Shizume), Iwanami, Tokyo, pp. 215

Strathern, P. (1999) Crick, Watson, and DNA. Anchor Books, USA, pp. 114

Watson, J.D., Crick, F.M.C. (1953) Molecular Structure of Nucleic Acids: A structure for deoxyribose nucleic acid. Nature, 4356, 737-8