

# Chapter - 16

## Universe and Organic Evolution

### 16.1 Origin of the Universe

The ancient belief about the origin of the universe is that the universe as it appears presently, it has always been the same. In this hypothesis, the earth was considered to be the center of the universe. After Copernicus proved that the Earth is not the center of universe, this concept became popular. In 1917, scientist Albert Einstein re-established the concept of stable Universe



**Figure 16.1** The Landscape of the Universe as observed through the Hubble Telescope

On looking upward, the infinite sky is visible. Due to the bright sun shine during the day time things other than the sun and sometimes the moon are not visible in the sky. In the night or after the sun set, some planets, innumerable stars and other bodies appear in the sky. This whole assembly is called the **Universe**. The study related to the Universe is called **Cosmology**. Our earth is a very small section of this infinite Universe. Is our Universe the only one or more such universes exist is a question on which scientists do not have one opinion.

### 16.2 Indian cosmology

In Indian culture, the thinking about the creation of the universe started from the Vedic times. From the past few years scientists have started to address the question of the origin of the universe. However Indian sages have started this work from ancient times. The

evolution of the universe has been discussed in detail in the '**Nasadiya Sukta**' of Rigveda. Describing the situation before the origin of the universe, it has been said-

*NASDASINNO  
SADASITTDANI NASIDRAJO NO VYOMA PRO YATAH A  
KIMAVRIVH KUH KASYA SARMNMBHA KIMASIDAH  
GAHANAH GAMBHIRAM AA*

**Rigveda: 10 - 126**

Pandit Jawaharlal Nehru also mentioned these Suktas of Rigveda in his book '**Discovery of India**'. The German scholar Max Müller called these Suktas '**the song of Genesis**'. Hindi translation of these Suktas was used as the title song of the television serial '**Bharat Ek Khoj**'

*SRISTI SE PAHLE SAT NAHI THA / ASAT BHI NAHI,  
/ ANTRIKSH BHI NAHI / AAKASH BHI NAHI THA / CHIPA  
THA KYA ? / KISNE DHAKA THA ? / US PAL TO / AGAM  
ATAL JAL BHI KAHAN THA ?*



**Fig. 16.2** Swami Vivekanand

(Meaning: There was no truth before the creation, nor were even lie/not even space / nor was sky / what was hidden? / where? / who covered it? / in that moment / where was the abyssal (deep) water also?).

Explaining the Vedic knowledge and intellect, Swami Vivekananda once said that conscioussness has created the Universe by multiplication of conscioussnesses. Various types of creatures and

objects are visible in the world but they are basically the same form of that one consciousness. This belief is called "**Advaita**". Swami Vivekananda said that answer to the question of the origin and development of the Universe has been given many times and will be given many times more in the future also but with every effort the belief of "Advaitism" would become strengthened.

As we look around the Universe, we find that everything starts with a seed. During its development, it grows and reaches its peak and in the end destroys by getting converted into a seed. The bird starts its life from an egg and its existence depends upon the egg. The cycle of egg and bird is repeated many times. This is the principle rule of the whole nature. It can be said that the Universe and atoms both are created in the same way. There is a cause behind every work. Because of being micro this cause is not visible to us. Maharishi Kapil has said '*NASHAH KARNALAYA*' that is someone's destruction means its mingling with its own cause and roots. On his death, a person meets with his "Panchabhuts". The Chemistry and Physics has confirmed this.

The seed is made from a tree, but the seeds cannot become a tree immediately. Seeds have to wait for some time in the ground to prepare themselves. Similarly, the universe also functions in a necessary abstruse micro form for some time. This is the situation before the catastrophe or creation. The term of being present in the subtle form for some time and its reappearance in the world is called a **kalpa**. Many such kalpas are running the Universe. All the objects, from the entire Universe to the atoms coming under it keep moving in a floating manner.

Sristi constructivism (design theory) is similar to the above mentioned Indian thought. Swami Vivekananda agrees with the materialists that wisdom is the ultimate development of the cosmos. Nowadays, we apparently feel wisdom as human intelligence. This does not mean that the origin of wisdom has begun just now. Intellect has always been present in hidden cryptic form. A fully developed human marks the end

of the nature/ creation. The omnipresent intellect which is exhibiting in the universe is named as **God**. Scientific sources that are present today were not present during the Vedic period. It was a great thing to imagine about the creation of the universe at that time. These days many Nobel laureates have supported the ideas described in the Vedas.

## 16.3 Theories

### 16.3.1 Theory of Biocentrism

In the 20th century, many famous scientists came to the conclusion that creation and operation of the universe cannot be explained merely on the basis of physical rules. They thought that the whole world was one unit. The entire universe was made up of one substance that was born during the Great Blast. The knowledge or consciousness of our being has originated from that substance only. A group of scientists has begun to accept that all the things in the world are different but they are actually related to each other. Our existence is like a drop in the Ocean like Param Brahma.

While clarifying this point, Nobel laureate Physicist Robert Lanza along with Astronomer Bob Berman proposed the theory of Biocentrism in 2007. According to this principle, the existence of this world is due to life. Putting it simply, the world has originated for the creation and development of life. Therefore, consciousness can be the true path to understand the aspects of nature. Without consciousness, world cannot be imagined.

The principles of philosophy to physics have been included in the concept of Biocentrism. The Man's independent will power cannot be explained by the principles of certainty and uncertainty. Assuming the physical nature of the world as definitive, the pre-supposition of each event is possible and assuming it uncertain, nothing can be pre declared. The organisms in the world independently exhibit certain and uncertain desires. It can be understood only by biocentrism.

Most materialists believed that the Lanza's thoughts are influenced by ancient mystical ideas and hence did not give any attention to them. Later on, in

the light of modern scientific facts, many other scientists attempted to explain the concept of Biocentricity. They presented the facts on the basis of the Relational Quantum Mechanics in a firm manner. This is the reason that even after many criticism; Biocentricity theory still remains a matter of discussion and conjecture.

According to Biocentrism, there is no physical existence of Einstein's place and time concept, but all of these are the senses of human consciousness. Lanza believes that only by keeping the consciousness in the center, many of the absurd puzzles of physics, such as the Heisenberg's uncertainty principle, the double Slit experiment, micro-balance constant of various forces and the harmony of various laws with the living world can be understood. Since the time of Einstein, scientists have been trying to bring the complete physics together in the form of Unified Field Theory, but success has not yet been achieved. Robert Lanza says that many such problems can be solved only by keeping life in the center.

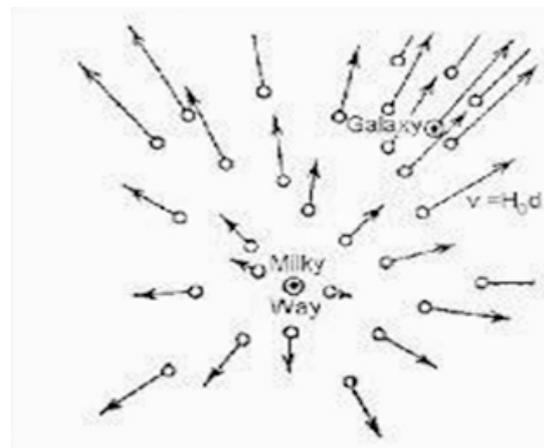
The supporters of Biocentrism opine that every event of nature seems to have occurred in human interest. Meteorites that occurred billions of years ago on the earth are also believed to occur for the betterment of humanity as they resulted in the destruction of the dinosaurs on the earth. This resulted in growth of mammals at a rapid pace. If the meteor would have been slightly larger in size or if they would have entered the earth's atmosphere at a different angle, then the whole life could have been destroyed. The meteorite was not a mere accident rather it was a pre-planned event of the nature.

Physicists like Wheeler said that the present exclusively represents the past, but then too it has to be believed that the development is pre-planned. The theory of Biocentrism does not accept Darwin's evolutionism theory. According to the principle of Biocentrism, life cannot be the result of any accident of physics and chemistry, as evolutionists think. Darwin's explanation of biological development on the basis of fortuitous incidences is fine for explaining the

concept to the kids, but in fact the matter is not that simple. Without a self-sustained plan, biological evolution cannot be explained properly.

### 16.3.2 Big Bang theory

The current and most recognized concept regarding the origin of the universe is **Big Bang**. Modified concept of Big Bang theory has succeeded in explaining various stages of the development of the universe from its origin. It is believed in this concept that universe originated 13.8 billion years ago by the great explosion in a very intense and extremely hot body. After explosion in this object, its parts spread far and wide likewise the parts of the universe are still spreading and moving away from each other. Science has gathered many evidences in the favor of the Big Bang concept. Excessive presence of lightweight elements in the universe, the presence of micro radiations in the space, the presence of giant structures and the success in understanding the Hubble's law are some evidences of this success.



**Figure 16.3 Outline depicting the Big Bang theory**

Importance of this concept is that it does not neglect any known rules of physics.

As the universe cooled down after the great explosion, it caused the evolution of sub-atomic particles. Sub-atomic particles later converted into simple atoms. From the atoms, giant clouds of the primary elements, hydrogen, helium and lithium were formed. Due to the force of gravity, the giant clouds

condensed and gave birth to stars and galaxies. Later, the origin of heavy elements from the primary elements is presumed to have taken place in stars or supernovas.

Measuring red displacement of supernovas has revealed the fact that the speed of the expansion of universe is increasing continuously. One opinion about how the universe will end has yet not been framed. There is an idea that it will continue to spread and ultimately will get frozen. Recent information about the presence of large amount of grey matter and dark energy in the universe was accepted. The role of grey matter in the universe is still not known.

A group of materialists under the leadership of Stephen Hawkins did not accept the existence of consciousness. These scientists are confident that in the coming times all the secrets of creation will be known with the help of materialistic means only. While the second group of scientists believes that the entirety of creation/ nature cannot be known without accepting the role of consciousness. Till now, no one knows what is the truth? Efforts to know the secret of the creation of the universe continues till this day. Scientists have discovered weightless particles in the ECNR (European Council for Nuclear Research) laboratory located in Geneva. This has raised a possibility for a likely change in the thinking of physics. Remembering the words of Swami Vivekananda, science in all places is moving towards accepting the existence of weightless consciousness. While discussing the Higgs boson particles, physicist Vijay Kumar Pandey writes that physics brings the unknown to the periphery of known but the secret of creation lies in the expanse of the agnosticism, not in the periphery of the unknown. God can be found not only by scientific research but also through cognitive self-realization.

Naturalist theories for the creation of nature have been given in India also. In Jainism it is believed that creation can never ever be destroyed. According to Jain philosophy, the compounds have always existed and will always remain. These compounds are controlled by the laws of nature and are running through their own energy processes. According to Jain

philosophy, the compounds are eternal. God or any other power did not make them.

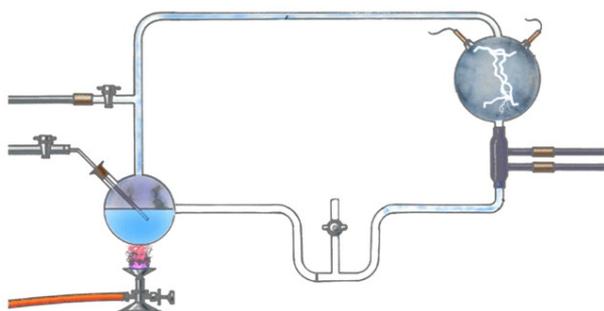
Paul Steinhardt of Princeton University presented the **Ekpyrotic model** for the origin of universe. This theory proposes that our current universe arose from a collision of two three dimensional worlds in a space with an extra fourth spatial dimension. This theory also believes in the spread of the universe but it is different from the spread of Big Bang. The universe is believed to spread like a rubber membrane. The structures of the universe are moving away from each other, but there is no central point of increasing distance.

### 16.3.3 Physical theories for the origin of life

On the basis of their observations, philosophers such as Aristotle attempted to explain the origin of organisms with inanimate substances. According to this belief, living things have originated from inanimate things like frog from mud, flies from rotted meat etc. The credit to reject the role of God in the genesis of organisms and analyze the origin of the organism according to the law of nature goes to Charles Darwin. Russian scientist Alexander Oparin, in 1924, gave a theory named '**origin of the life**' regarding the origin of living organisms from the nonliving. Oparin said that Louis Pasteur's statement is perfectly true that the origin of the one organism occurs from the other organism but this principle does not apply to the first organism. The first creature would have originated from inanimate substances only. Oparin said that there is no fundamental difference between living and nonliving. Life has developed from the complex combination of chemical substances. The presence of methane on various celestial bodies is a sign of the fact that the atmosphere of early earth due to the presence of methane, ammonia, hydrogen and water vapor was extremely reducing. The complex compounds made by the combination of these elements have combined further and created more complex compounds. Different configurations of these complex compounds have laid the foundation of life. Once started, these biological symptoms would have moved ahead on the path of competition and struggle and ultimately created

the present animated world.

In 1929, J.B.S. Haldane expanded the views of Oparin. Haldane divided the events from the origin of the earth to the formation of nucleated cells in eight stages. Haldane said that after separation from the Sun, the Earth gradually cooled down and a variety of elements developed on it. Heavy elements went towards the center of the Earth and the hydrogen, nitrogen, oxygen and argon made the initial atmosphere. These atmospheric elements through mutual interactions resulted in the formation of ammonia and water vapor. These processes consumed all the oxygen and created a reducing environment. Due to the effect of sunlight and thundering, a series of chemical reactions continued for a long period and resulted in the formation of amino acids, sugars, glycerol and many other types of compounds. The dissolution of these compounds in water resulted in the formation earth's primordial hot soup. There were no experimental evidences for the assumptions of Oparin and Haldane. In 1953, Stanley Miller supported the ideas of Oparin and Haldane by publishing the "**possible production of amino acids in the early stages of the Earth**". Miller created an electric discharge device for experimentation. This device had a round bottom flask, an electric immersion bulb and a condenser. After filling water in the round bottom flask, air was evacuated from the system and the device was filled with methane, ammonia and hydrogen in the ratio of 2: 1: 2.



**Figure 16.4 Apparatus used by Miller for the formation of biomolecules.**

Using electrical discharges, water was boiled and the steam so produced caused the rotation of gases in

a continuous circle. After condensation, the water vapor released from the electric discharge bulb could be collected for analysis. Miller analyzed the condensed fluid obtained after one week continued electrical discharges. Fluid analyses revealed the presence of various types of organic compounds like amino acids, acetic acid etc.

#### **16.3.4 Spiritual theories for the origin of life**

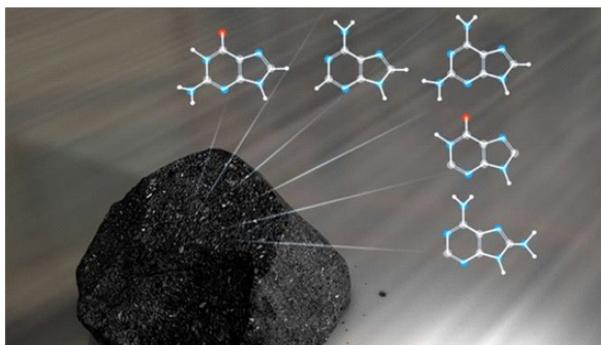
Life is not just a group of molecules. With the ever increasing knowledge about life, it is becoming even more difficult to explain the origin of the first creature. The idea of Oparin and Halden, which was established a long time ago experienced a setback when many young scientists refused to believe that the first creature born in the primordial soup was able to fulfill its energy needs through anaerobic respiration. They said that the Oparin and Halden's ideas do not conform to the principles of bio-physics and thermodynamics.

Current life is fully based on DNA. The information stored in the DNA is transported outside the nucleus into the cytoplasm by the RNA. As per the information received from the DNA, ribosomes present in the cytoplasm synthesize the proteins (enzymes). All reactions of life are directed by the catalytic functions of the enzymes. All kinds of synthesis takes place in the cell. Many types of proteins (enzymes) functions for the synthesis of DNA. So it is natural to raise this question that during the development of life, DNA came first or the proteins? It is quite possible that DNA was not there in the initial stages of life. RNA along with its functions might have played the role of DNA and proteins. Looking to the complexity of life, many scientists believe that several metabolic cycles have developed independently before the birth of life. As per the individual requirements, these metabolic cycles were utilized by various living beings.

New researches have brought a strategic shift in the study of the history of the origin of the first organism. Now, it has been revealed that the initial atmosphere was dominated by the oxygen containing gases such

as carbon dioxide, sulfur dioxide, water vapor etc. If this idea is accepted, then the previous theories of the origin of the first organism which were established by keeping in mind the reductive nature of the atmosphere have to be abandoned.

The first organism was not born on earth, rather came from a heavenly body in the form of subtle spores. The hypothesis of living beings coming from some outside place is very old. Lord Kelvin, Von Helmholtz etc. have given this theory in the nineteenth century. In the twentieth century Fred Hoyle, Wikramasinghe, Jayant Vishnu Narlikar etc. presented the same idea with new facts but this idea did not gain much attention as compared to the primordial soup hypothesis



**Figure 16.5 Discovery of biological molecules in Meteorites**

Now the conditions have changed. After the development of new tools of research, some new facts have come to light, on the basis of which the scientists now firmly believe that the origin of the first organism was not on the earth. The micro-fossils obtained from the rocks of Hadean period have shown that the photosynthetic life on the Earth existed about 4 billion years ago. If this is the fact, then the matter of the origin of life on earth by chemical processes in just 58 million years cannot be considered as true. In this way, the only option left is - life on earth has come from some outside place.

Scientists believed that during the Hadean era life on Earth showered in the form of subtle spores. On Mars, life reached almost at the same time. Today,

there are strong evidences that subtle particles can emerge from the atmosphere of one planet and after successful completion of the long and difficult journey of space, can descend on another planet. The scientists believe that the life has not originated only once rather it has originated many times at different places. Life after origin has spread in every direction.

Multi-directional efforts have been made from a long time to know the existence of life in the space. Information is being gathered by sending the spacecraft's to the solar system and beyond it. More information is being assembled by installing huge telescopes on the earth and in the space. The existence of Aliens is being discovered in the meteors that fall on the Earth. During the studies of meteors, presence of some acids like citric acid and its compounds that function in the cellular metabolic pathways have been found. Various ideas have been put forward about the origin of life on the Earth but no consensus has yet been made in the favour of any one.

Earth's atmosphere has proved very favorable for life. Life has taken different shapes so as to adapt itself in a variety of environmental conditions prevailing in different parts of the earth. A group of organisms capable of maintaining its nature/ characters over generations is called a **species**. Approximately 3 lakh species of flora, 12 lakh animals and about 10 lakh species of micro-organisms have been found. Along with the formation of new species, some species have been extinct. Like the species of dinosaur and dodo birds. The increased pollution and population has resulted in the loss of habitats which in turn has resulted in a sharp decline in number of members of many species. Domestic birds like sparrow etc. are facing the risk of extinction.

#### **16.4 Fossils - origin and types**

We know that the living organism have originated on the Earth billions of years ago. Since then life has evolved in various forms. Among these, many forms of life such as Dinosaurs have disappeared. The only source of information about the extinct organisms is

their remnants. The symbols/ remnants/ impressions or traces of ancient organisms are called as fossils. **Fossils** are made by the burial of organisms/ substances in the soil or other substances millions of years ago. The fossils of an elephant like organism buried in the ice were found in such a highly protected form that it seems as if this creature has died recently (but not billions of years ago).



**Figure 16.6 The Elephant like organism Hairy Mammoth which was found in the ancient times**

Fossils buried in substances like amber or lac are also good enough. Sometimes the body of the buried organism is destroyed gradually, but it remains preserved in the form of an impression embedded in rock/mud. After seeing the fossils of Archaeopteryx, which were found in the form of an impression, it was discovered that birds originated from creeping



**Figure 16.7 Fossil of Archaeopteryx**

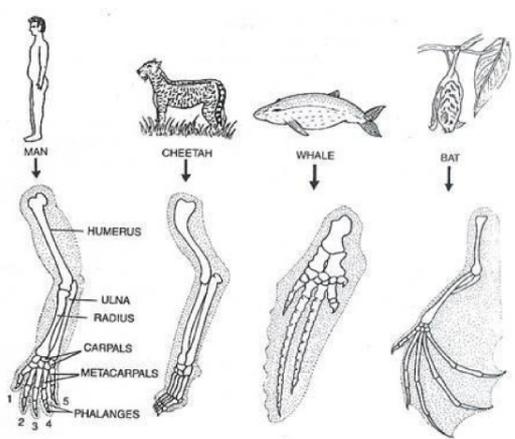
organisms. The soft parts of dead organisms get destroyed by decomposition but the harder parts like bones etc get pressed and preserved safely. From such fossils we have come to know that today's horse has evolved due to time to time changes accumulated in a fox-like organism.

Sometimes organic molecules in the body of the organisms are destroyed and their place is occupied by the inorganic molecules. As a result, in place of the organism, its stony idol gets prepared whose inner and outer conformations are similar to that organism. Fossils of many plants have been obtained in this form only. Indian scientist Birbal Sahni made a detailed study of fossils and assembled a lot of information for the world of science. Few organs in the body of the some organisms have no use. These are called vestigial organs. For example, there is no use of wisdom teeth and vermiform appendix (which is found connected with large intestine) in the present human body. The age of fossils can be calculated in two ways. The fossils obtained by deeper excavation are older. The age of fossil can also be calculated from radiocarbon dating. It is said that fossils narrate us the story of the old world, but this story is somewhat incomplete because the fossil of every organism is not available.

### 16.5 Organic evolution

From the ancient times, presence of various organisms found in the world has raised many questions in the mind of the man, but in the absence of any suitable answer, man satisfied himself by putting every responsibility regarding the creation of every thing on the God. After knowing that organisms found today are not the same as were present millions of years ago and many species found in the past are not present on today's earth, it was assumed that the successive evolution of the organisms has taken place.

The credit for explaining the biological evolution with logic goes to Charles Darwin, who in 1859 wrote a book "**The origin of Species**" based upon the development of species and shocked the old beliefs. Darwin through embryonic science (developmental



**Figure 16.8 The basic structure of human hand, front leg of cheetah, fins of fishes and feathers of bats are the same.**

biology), morphology, classification, functioning, somatology, fossils, different comparative studies and many other areas presented irrefutable evidences in the favour of evolutionism.

Figure 16.8 is showing that humans, cheetah, fish and bats are fairly different from each other, but the fundamental structure of human hand, cheetah's forehead, fins of fishes and wings of bats are the same. It is a proof of the fact that all these living creatures have originated from the same ancestors. The body of all the multicellular organisms is composed of eukaryotic cells. Enzyme trypsin, which digests proteins is functional in all i.e. from a unicellular organism to humans. The DNA that regulates the characteristics of all organisms works similarly in every organism. All these things confirm biological evolution. After studying the comprehensive classification of organisms, it seems that there has been a gradual development of multicellular organisms from unicellular organisms. The botanical studies have also provided evidences of biological evolution. The religious believes also provides the signs of biological evolution. In India, it has been said that after undertaking 84 lakh births ('yonies'), one gets human birth. This comment might have been made by viewing the development of human embryo from a cell.

### 16.5.1 Process of organic evolution

After obtaining the evidence of biological

evolution, it was natural to raise the question that what was the process of biological evolution? Considering the qualities acquired by more use of some organs and comparatively less use of others as an inherited quality, Lamarck tried to explain the emergence of the new species. He told that some animals like lizard used crawling motion neglecting their arms and in the long run arms disappeared. This resulted in the origin of snakes. In the same way, Lamarck explained the development of Giraffe and Duck. Vismen cut the tail of the rats many generations and observed the tail length in progeny rats. He found full length tail even after 10 generations. Vismen said that the acquired qualities are not inherited.

Charles Darwin explained the origin of species through natural selection. Darwin said that the organisms of each species are produced in large numbers. No two organisms are alike. When organisms are present in high numbers, they engage themselves in struggle for food, space and others. During struggle only that organism which is best suited in nature produced large number of offsprings and produces new species. At that time the Mendelian laws of Inheritance were not known. Darwin could not explain the reasons behind the variations found among the organisms. People could not understand the formation of new species by accumulation of slight variations found in the members of same family or species.

In 1901, Hugo de Vries, a Dutch Botanist saw a new type of Primrose plant in between the group of Primrose plants growing in the garden. After further study, deVries said that the sudden big changes in organisms result in the origin of new species. de Vries named such changes as **mutations**. Today, we know that the properties of organisms are controlled by the DNA found in their cells. These properties are decoded by a chain of four nitrogenous bases *viz* Adenine, Guanine, Cytosine and Thymine which are represented by four letters A, G, C and T respectively. Any change in the sequence of nucleotides cause alterations in the characters of the organisms.

By combining de Vries mutations with the Darwinism, Neo-Darwinism theory was put forward. The Neo-Darwinism was accepted as a "true" reason for the creation of species. As you know that nothing in science is true. The evolutionary biologist Lynn Margulis, in 1995, disproved the Darwin's evolutionism and said that the road to evolution in nature has marched through mutual cooperation but not through competition. Margulis said that as per evolutionists, the history of animals begins from last 50 million years, whereas life on earth came into existence long before it. Fossils with an age of more than 400 million years have been reported. Darwinists did not consider those fossils because their thoughts are not supported by them. While Darwin told that the monkeys are ancestors of human beings, Margulis declared that bacteria are ancestors of all including monkeys. These days concept has changed. It is now believed that humans have more bacterial cells than human cells. The health of a person depends on the bacteria present in its body. To stay healthy, Indian thinking of proper food habits has become stronger.

### 16.6 Origin of species

Earth's atmosphere has proved very favorable for life. Life, in order to adapt itself as per the environmental variations found in different parts of the earth, has taken different shapes. A group of organisms capable of maintaining their characters over generations is called a species. Approximately, 3 lakh species of flora, 12 lakh animals and about 10 lakh species of micro-organisms are found. According to Neo-Darwinism, the development of species depends upon variations generated in organisms and the struggle associated with life. According to this theory, few long-necked Giraffe would have suddenly originated among the Giraffe's of ordinary neck length. Due to its long neck, the new giraffe could eat more food than the older ones, which is why it produced more healthy offsprings in large numbers. In the long run, the present species of Giraffe originated from the offsprings of the long necked Giraffe.

Margulis raised the question that how do such

beneficial mutations caused by natural selection occur in the organisms? Margulis said that biological evolution cannot be explained by examples of animals. By explaining biological evolution with the examples of animals, we miss the three billion years history of life on Earth. The bacteria through mutual cooperation have given rise to the entire living world. The question about the process of evolution/ development of a species is still unanswered. You can also think something new about this subject.

Along with the formation of new species, some species got extinct. Like the species of dinosaur and dodo birds. The increased pollution and population has resulted in the loss of habitats which in turn resulted in decline in the number of members of many species. Domestic birds like sparrow etc. are facing the risk of extinction.

### 16.7 Phylogeny

The living organism seems different in appearance, but the basic structure and functioning of all the organisms found on earth is the same. According to the Margulis, bacteria with mutual cooperation have given birth to the entire animated world. Life has originated only once and all the other forms of life are created from this. All the species are dependent on each other. The effect of the loss of one species can be observed on others. As a theory, the American organization NASA has also started to believe that the whole earth is working together as an organism. Therefore, from the micro-organisms to the human beings, one should consider each and every thing as one unit.

Each species found on earth has developed from pre-existing species or accumulation of variations due to different reasons in the pre-existing species. For this reason, each species has its own history of evolution. This history is called **phylogeny of a species**. Using different scientific methods, the phylogeny of different species has been elucidated. After the development of DNA polymerase chain reaction, it is now possible to know the phylogeny of various species in a very convenient and

quick way. It is now possible to know the long history of a person's original ancestors. People have started analyzing their DNA curiously. Sometimes what is visible to us is just opposite to the history. An American person used to ridicule the African people and considered them inferior. On DNA analysis, he himself was found to be of African origin. It is clear that discrimination on the basis of caste or religion is not appropriate. The origin of whole mankind is the same.

### **Important Points**

1. In the night after the sun set, some planets, innumerable stars and other bodies appear in the sky. This whole assembly itself is called as Universe. Our earth is a very small section of this infinite Universe.
2. In Indian culture, the discussion on the idea of the creation of the universe has started since Vedic times. The evolution of the universe has been discussed in detail in the 'Nasadiya Sukta' of Rigveda. Swami Vivekananda said that answer to the question of the origin and evolution of the Universe has been given many times and will be given many times more in the future also but with every effort the belief of "Advaitism" will be strengthened.
3. The intellect has always been present in an incognito form. A fully developed human marks the end of the nature/ creation. The omnipresent intellect which is exhibiting in the universe is named as God.
4. According to the theory of Biocentrism, the existence of this world is due to life. The world has originated for the creation and development of life. According to Biocentrism, there is no physical existence of Einstein's place and time concept, but all of these are the senses of human consciousness.
5. The supporters of Biocentrism say that every event of nature seems to have occurred in human interest. Darwin's explanation of biological development on the basis of fortuitous incidences is fine at the children's level, but in fact the thing is not that simple. Without a self-sustained plan, biological evolution cannot be properly explained.
6. It is believed in the big bang concept that, 13.8 billion years ago, the origin of the universe was caused by a great explosion in a very intense and extremely hot body. After explosion in an object, its parts spread far and wide likewise the parts of the universe are still spreading and moving away from each other. Measuring red displacement of supernovas has revealed the fact that the speed of the spread of Universe is increasing.
7. A group of materialists under the leadership of Stephen Hawkins, did not accept the existence of consciousness. These scientists are confident that in the coming times all the secrets of creation will be known with the help of materialistic means only.
8. Many Earth like planets have been discovered in space. Efforts have been made to find out life on other Earth like planets. Until this book is written, no life outside the Earth has been found.
9. The first creature would have originated from inanimate substances only. Oparin said that there is no fundamental difference between living and nonliving. J.B.S. Haldane expanded the views of Oparin. Haldane divided the events from the origin of the earth to the formation of nucleated cells in eight stages.
10. Life is not just a group of molecules. With the ever increasing knowledge about life, it is becoming even more difficult to explain the origin of the first creature. The idea of Oparin and Halden, which was established a long time ago experienced a setback when many young scientists refused to believe that the first creature born in the primordial soup was able to fulfill its energy needs through anaerobic respiration.

These scientists believe that during the Hadean era life has showered on Earth in the form of subtle spores. On Mars, life had reached almost the same time.

11. A group of organisms capable of maintaining its nature/ characters over generations is called a species. Approximately 3 lakh species of flora, 12 lakh animals and about 10 lakh species of micro-organisms have been found. Therefore, from the micro-organism to the human beings, one should consider each and every thing as one unit.
12. The symbols/remnants/ impressions or traces of ancient organisms are called as fossils. Fossils are made by the burial of organisms/ substances in the soil or other substances millions of years ago. The fossils of an elephant like organism buried in the ice were found in such a highly protected form that it seems as if this creature had died recently (but not billions of years ago). It is said that fossils narrate us the story of the old world, but this story is somewhat incomplete because the fossils of every organism are not available.
13. Each species has its own history of evolution. This history is called phylogeny of a species. Using different scientific methods, the phylogeny of different species has been elucidated.
14. Organisms present today are not the same as were present millions of years ago. The credit for explaining the biological evolution with logic goes to Charles Darwin, who in 1859 wrote a book "The Origin of Species" based upon the development of species and shocked the old beliefs.
15. After obtaining the evidence of biological evolution, it was natural to raise the question that what was the process of biological evolution? Considering the qualities acquired by more use of some organs and comparatively less use of others as an inherited quality, Lamarck tried to

explain the emergence of the new species.

16. Charles Darwin explained the origin of species through natural selection. People could not understand the formation of new species by accumulation of slight variations found in the members of same family or species. The sudden big changes in organisms result in the origin of new species. deVries named such changes as mutations.
17. Margulis raised the question that how do such beneficial mutations caused by natural selection occur in the organisms? Margulis said that biological evolution cannot be explained by examples of animals.

### Practice questions

#### Objective type questions

1. What was present before the formation of earth?  
(a) Water (b) Truth  
(c) Lie (d) None of these
2. Which Scientist revived the idea of a stable universe?  
(a) Darwin (b) Oparin  
(c) Einstein (d) Stanley Miller
3. Which is the most acceptable concept regarding the origin of the universe?  
(a) Stable Universe (b) Big Bang  
(c) Biocentrism (d) Indian concept
4. About how many years ago, photosynthetic life was present on Earth?  
(a) 4 billion (b) 3 billion  
(c) 5 billion (d) Uncertain
5. A group of organisms capable of maintaining their nature over generations is called  
(a) Ancestry (b) Association  
(c) Community (d) Species

### Very short type questions

6. Which sukta of the Rig Veda discusses the origin of the Universe in detail?
7. Can life be considered as a group of molecules?
8. Presently life is based upon which molecule?
9. What has changed in scientific thinking about the early atmosphere of Earth?
10. What is the history of the development of each species called as?

### Short type questions

11. How can one get information about extinct organisms?
12. In which form did the fossil of Archaeopteryx was found?

13. What are vestigial organs? Write the name of one vestigial organ of the human body.
14. Can life from outside the Earth enter on the earth?

### Essay type questions

15. Explain Indian thinking about the origin of sristi.
16. Explain the theory of Biocentrism of the creation of the universe. How is it different from the materialistic approach?
17. What is the Big Bang concept of creation? How is it different from the Indian concept?
18. What do you understand by biological evolution? How according to you biological-evolution has taken place?

### Answer key

1. (d) 2. (c) 3. (b) 4. (a) 5. (d)