UNIT 3 EVOLUTIONARY PERSPECTIVES OF HUMAN PERSON

Contents

3.0. OBJECTIVES

The study of different theories of human origin identifies two main opposing theories: vitalism and mechanism. Vitalism considers life as a singular, originary phenomenon, irreducible to matter: that it traces its origin to the one, the Nous, the Logos, God, an angelic Intelligence, the Spirit. Criticizing vitalism to be an ideological cover for determined religious concepts and certain political systems, mechanism is of the conviction that life sprang as a fruit of chance or necessity.

The objective of this unit is to explain mainly the mechanistic approach to human origin and its further development in the philosophical outlook. Evolution is the main theme dealt with in this unit. Various evolutionary approaches to human origin would enable us:

- to look at human origin from scientific point of view and
- to understand philosophical reflections on the phenomenon of human origin.

3.1. INTRODUCTION

Where did we come from? It is a question that has haunted the entire history of humanity. Thousands of years ago, our ancestors sought to answer the question with myths. Today, we are still struggling with the same question—only today we seek to answer this mystery with science. Following the scientific revolutions in the West, various developments in the natural sciences, including geology and biology, led to new perspectives on the humankind's origins.

Organic evolution traces the development of simple unicellular forms to more complex forms, ultimately to the flowering plants and vertebrate animals, including humans. The Earth contains an immense diversity of living organisms: about a million different species of animals and half a million species of plants have so far been noted described. Some religions deny the theory of evolution, considering its conflicts with their belief that God created all things. But most people accept that there is overwhelming evidence that the diversity of life arose by a gradual process of evolutionary divergence and not by individual acts of divine creation. There are several lines of evidence: the fossil record, the existence of similarities between different groups of organisms, genetics, embryology, and geographical distribution.

The emergence of human being as a distinct species about a quarter of million years ago marks the beginning of a new chapter in the long evolutionary scale of billions of years. Human being (Homo sapiens) has evolved as unique being with qualities different from other animals, not only in degree but also in kind. However, he/she keeps his/her continuity with the lower forms of life and hence many modern scientists would emphasis 'the descent of human being' from lower forms and his/her common features with other animals. It is believed that new qualities emerge when lower forms of life evolve into more complex and advanced ones. And the new qualities which are manifested at successive stages move in the direction of more consciousness, more freedom and greater capacity for love.

3.2. EVOLUTION OF HUMAN BEING

According to the theory of Organic evolution, origin of life must have taken place in this world. The first organism was very minute and in the form of unicellular structure. As the time passed on, most of the unicellular forms were transformed into multi-cellular forms under the various

environmental oscillations. Gradually the simple form of animals was converted to very complex type of animals. As a matter of fact, the geo-environment of the earth underwent a process of continuous change and influenced the animal forms. Complex forms of animals evolved out of the simple forms in a slow and steady way.

Before Darwin, several scientists and philosophers expressed their views regarding the evolution. Carl Linnaeus (1707 – 1778) placed man in the order of Primate along with apes and monkeys, but did not suggest any common ancestry for them. Mon boddo (1714 – 1790) by observing the origin of species, traced the evolution of man from the monkeys, by observing the origin of species. Bonnet (1720 – 1793) also worked on the process of evolution and proposed a 'scale of beings'. His proposition went on an ascending order from the mineral to man. Many more scientists worked with the origin of man. Among them, the contribution of Erasmus, Darwin (1731 – 1802), Karl von Baer (1792 – 1876), Schopenauer (1788 – 1860) and Charles Lyell (1797 – 1875) seem to be indispensable for proper understanding of the facts of evolution. Immanuel Kant (1724 – 1804) proposed that the man be descended from the monkey.

The first systematic attempt was made by Jean Baptiste Lamarck (1744 – 1829), a French biologist who was an eminent pre-Darwinian student of evolution. He proposed the 'inheritance of acquired characters' during the life time of the individual. Following Lamarck's proposition, Charles Darwin and Alfred Russell Wallace jointly proposed the theory of the 'Origin of Species' by *Natural Selection*. Darwin's evolutionary theory had its base on the accumulation of small fluctuating variations. He had realized that heredity was an essential factor in the study of evolution, though he did not put much importance to it. August Weismann realized the importance of heredity better than Darwin did. He emphasized on the 'continuity of the germ plasm' and tried to project the transmission of inherited qualities from generation to generation by the germ cells. Hugo de Vries, one of the re-discoverers of Mendel's laws of heredity, announced mutation theory of evolution in 1901. He considered *mutation* (i.e. sudden heredity changes) as a factor behind evolution. Natural selection found very little or no place in his mutation theory. But, later, the geneticists, biometricians, and palaeontologists revived the faith in *natural selection*. Of these, the most important development took place in the field of genetics; the natural selection began was started to be restudied and reinterpreted by the geneticists.

Theodore Dobzhansky and R.B. Goldschmidt laid foundation for the Neo-Darwinian theory. The genetic theory of Natural Selection is therefore referred to as Neo-Darwinism. R.S. Fisher, J.B.S. Haldane and Sewall Wright made valuable contribution to the statistical analysis of population, and secured own position among the principal proponents of Neo-Darwinism. The current theory of evolution, called neo-Darwinism, combines Darwin's theory with Austrian biologist Gregor Mendel's theories on genetics and Hugo de Vries's discovery of genetic mutation.

The scholars, like C. Llyod Morgan, who upheld emergence theory of evolution, came with doctrines to cope with the influence of Darwinism as Philosophy by providing a way of interpreting evolution without having recourse to vitalistic, mechanistic, reductionist and preformationist ideas. The interpretations given by those four theories were rejected by C. Llyod Morgan and others:

(1). the vitalistic attribution of them to the action of a unique, undetectable life force;

(2). the mechanistic attribution of them to the operation of physiochemical laws alone;

(3). the reductionist contention that whatever has happened in evolution is at bottom a reshuffling of certain fundamental units, which themselves remain unchanged;

(4). the preformationist contention that organic variety, diversity and complexity are simply actualizations of potentialities contained all along in living substances.

In opposition to these views the concept of emergence implies that the variety, diversity and complexity engendered by evolution are irreducible, cumulative features of the creative advance of nature. From time to time the evolutionary process has produced items the like of which had never been previously exemplified anywhere in its history.

Darwin's theory of evolution

Darwin's theory is based on four main postulates:

Prodigality of Nature

All species have a tendency to produce more and more off-springs in order to increase the number of population. The basic reason behind this huge production is to ensure the survival.

Struggle for Existence

All progeny produced by any generation do not complete their life cycle; many of them die during juvenile stages. Darwin therefore proposed his concept of 'Struggle for Existence'.

According to him, the struggle for existence may be of different types. It may be a Struggle to overcome adverse environmental conditions (like cold or drought), or to obtain food from a limited source of supply. It may be a fight for occupying a living space, or even to escape from the enemies. However, any of these said situations leads the members of a group towards competition in order to meet their requirements.

Organic Variation

Variation is a universal phenomenon. Even the two leaves of a plant show easily recognizable differences. Therefore individuals of a single species must vary from each other. At times, an entire population may exhibit a definite pattern of variation for which it is distinguished from the rest of the species. Such a population showing definite pattern of variation is referred to as subspecies. Darwin believed that, in course of time, this subspecies would be subjected to further variation to give rise a new species.

Natural Selection

Individuals differ from each other because of organic variation, which evidently means that some individuals are better adapted to survive under the existing environmental conditions than others. In the struggle for existence, the better-adapted individuals possess a better chance of survival than those who are less adapted. The traits having greater survival value are preserved in the individuals and transmitted to the off-springs, who are supposed to be the progenitors of the next generation. Darwin called this principle, by which preservation of useful variation is brought about, as natural selection. The same principle (national selection) is designated by Herbert Spencer as ‘survival of the fittest’.

Darwin’s theory may be summed up this way: The organisms always struggle to maintain their existences as nature decides the survival of the fittest ones. Adaptive traits preserved through natural selection gradually change the characteristics of species and thus evolution occurs.

The human ancestry was discussed by Darwin in his book, “The Descent of Man” which was published in 1871. He said that life ascended from simplest form of minute organisms to the complex forms through different stages of evolution where man is found at the summit.

The theory of the origin of species by natural selection, though is regarded as a major advancement in evolutionary thought, it lacked the knowledge of heredity, which was essential

for the understanding of evolutionary studies. It was unfortunate that Darwin never came across Mendel's work, who by then invented the basic principles of heredity.

Mutation theory of Hugo De Vries

Hugo De Vries' Mutation theory focused attention upon the importance of mutation in evolution. In this theory, De Vries declared that evolution is not a slow and gradual process involving accumulation of numerous small changes by natural selection. Conversely, the evolutionary changes appear suddenly and are a result of large jumps, which he designated as mutation. Mutation theory distinguished heritable variations from environmental variations, which Darwin failed to understand in his 'Natural Selection'. As a consequence, in the early years of twentieth Century, Darwin's natural selection was totally rejected in explaining the process of evolution.

Theory of Gregor Mendel

The real mechanism of mutation was properly understood through the work of Gregor Mendel and the recent discoveries in the field of molecular biology. The mutation as understood today is concerned with genes, the discrete units of heredity, which occupy particular loci on the chromosomes. It tells that each gene controls a specific developmental process and is responsible for the appearance of specific traits in an organism.

Mendel used the term 'factor', when he described his 'Law of Inheritance'. But in 1900 the term was replaced by the new term 'gene' and a new science gradually developed with the name 'Genetics'. Now it is known that a gene represents a specific segment of the DNA molecule. The product of a gene action, in many cases, is a protein; and the developmental process in a given organism depends on specific kind of proteins produced under the instruction of a particular set of genes. A mutation in a gene often causes corresponding changes in the protein concerned. If mutation occurs in the germ cells of an organism, the change will be inherited by its off-spring. Therefore, only those mutations that cause changes in the reproductive cells of the organism are of evolutionary significance. But the structural changes of chromosomes can not be undermined because they often bring considerable effects in the evolution as found in many plants and a few animals.

Synthetic Theory of Evolution (Neo-Darwinism)

In the middle of twentieth Century, Scientists had come to a consensus to employ all sorts of knowledge – genetic, ecological, geographical, morphological, palaeontological, etc., in order to understand the actual mechanism of evolution. Due importance was given to both mutation and natural selection, among other forces of evolution. This led to the emergence of a synthetic theory of evolution, which we also call as Genetical Theory of Evolution or 'Biological Theory of Evolution'. Some authors have called this new theory as Neo-Darwinism.

After the development of the science of genetics, it has been known that a population shares a common gene pool. Accordingly, the evolution denotes a change of gene – frequency in the gene pool of population over certain span of time. The synthetic theory of evolution does not discard all previous propositions, rather considers them as partially important. Therefore, we find amalgamation of various concepts, namely, Natural Selection, Mendelian principles, Mutation, population genetics in this theory of evolution. However, at present evolution appears to be a complex process involving several complex forces.

Check Your Progress I

Note: a) Use the space provided for answer

b) Check your answers with those provided at the end of the unit

1) What are the early theories of human origin opposed by Emergence theory?

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2) Explain Organic evolution in short.

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3.3. SCIENTIFIC EVIDENCES

The scientific evidences that support evolutionary perspectives are studied here briefly:

Comparative Anatomy

The three main evidences from comparative anatomy are based on: (i). the similarities which are found in organic structures of various animals; (ii). the vestigial organs found in many animals; (iii). the difficulty of systematic classification of plants and animal species.

(i). when, for instance, we study the structure of the forelimbs of vertebrates we find great similarities among them. They include similar bones, in the same relative positions, but to perform different functions, e.g., the hand of man, the leg of horse and the wing of bat. Their similarity in structure and diversity in function all point to a common ancestor and an evolutionary process.

(ii). the vestigial organs found in quite a number of animals, are of no possible use. Such are the vestigial eyes of many cave animals, the vestigial wings of certain species of birds, the rudiments of hind limbs in some snakes and in the whale-bone. These rudiments might have been actually used by their ancestors.

(iii). it is difficult to distinguish between certain animal and plant species. A considerable number of organisms falls between the groups which have been set up, constituting transitional forms. This is easy to explain if they descend from common ancestors.

Data from Palaeontology

Palaeontological observations have been documented as far back as the 5th century BC. The science became established in the 18th century as a result of Georges Cuvier's work on comparative anatomy, and developed rapidly in the 19th century. Fossils found in China since the 1990s have provided new information about the earliest evolution of animals, early fish, dinosaurs and the evolution of birds and mammals. Palaeontology lies on the border between biology and geology, and shares with archaeology a border that is difficult to define. It now uses techniques drawn from a wide range of sciences, including biochemistry, mathematics and engineering. As knowledge has increased, palaeontology has developed specialized subdivisions, some of which focus on different types of fossil organisms while others study ecological and environmental history, such as ancient climates. The study of fossils, gives us some evidence for organic evolution. Fossils are portions of organisms of the past ages, preserved by being

incorporated in stratified rocks or in trees. The older strata of rocks give the fossils of simpler types of organisms while the more recent ones give the fossils more complex and developed types. However, the fossils record is incomplete, as certain connecting links are missing.

Biogeography

How can we explain the origin of the animal species on the oceanic islands? The best explanation is that in the distant past the forebears of these animals reached these islands from the continent, either by their own power (swimming, flying) or swept along by wind or water currents or borne on the branches of uprooted trunks of trees. The absence on these islands of any animal form which could not have travelled in any such way confirms this explanation. But these animals differ considerably from the species which live on the nearest continents. The dissimilarities increase in proportion to the distance of each island from the continent, and they may go all the way to a difference not only in species but in genus or in family. The theory of evolution holds that the species which landed on these islands long ago, having evolved in isolation from their continental counterparts, have developed their own characteristics during the course of their separate evolution.

Embryology

Embryology deals with the study of the development of individuals from egg to the adult stage. It has been observed that the preliminary course of ontogeny in different animals belonging to different classes shows certain similarities. For instance, the young embryos of different vertebrates possess long tails and gill. Again, the matter of development of various classes of vertebrates shows a striking similarity. These are also instances which indicate relationships within a class or between classes. These observations in the early part of the 19th century led many biologists to conclude that higher animals in their embryological development passed through stages which correspond to the adult stages of lower animals which according to the theory of evolution would be their ancestors. The German biologist Ernest von Haeckel was the first to notice this striking similarity. His famous ‘biological law’ or ‘theory of recapitulation’ states that embryonic stages of a higher animal resemble the adult stages of its ancestors. This theory which was once ardently supported is not accepted by modern biologists, as postulated by Haeckel, for various reasons.

Genetics

Geneticists can, to a certain extent, see evolution occurring under their very eyes in the laboratory. A careful study of hundreds of generations of short-lived animals, such as the fruit-fly, discovers slight changes in their inherited characteristics, resulting in many new races. Some of these races may eventually differ enough from each other to be viewed as new species. These changes may happen spontaneously. In other cases, they may be induced by the geneticist himself.

Check Your Progress II

Note: a) Use the space provided for answer

b) Check your answers with those provided at the end of the unit

1) How far Palaeontology can help us to explain evolution?

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2) Explain evolutionary change and genetics.

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3.4. ALL EMBRACING EVOLUTION

Evolution is not limited to the sphere of living things, but embraces all reality. Thomas Henry Huxley points out three sectors of reality or three phases of evolutions: (i). the inorganic or cosmological; (ii). the organic or biological; (iii). the human or psycho-social. These three sectors differ radically in their extent, both in space and time, in the methods and mechanisms by which their self-transformations operate, in their races of change, in the results which they produce and in the levels of organization which they attain.

Darwin was preoccupied with the evolution at the organic level. But modern biologists, like Huxley, Simpson and Dobzhansky, are equally concerned with the evolution at the human phase when new trends are expressed, especially by the formation of culture.

Human Cultural Evolution

Self-preservation, reproduction and greed are biological imperatives. They arose from millions and billions of years of biological evolution. They are as much a part of human life as any other life on earth.

However, humans are not just biological creatures. We are also social creatures, the most social on earth. The ways we deal with each other, from personal to international relationships, can have as much an influence on our behaviour as our instinctive reactions. But our societies and cultures did not spring all of a sudden. They grew and developed during millions of years of cultural evolution. And the closer our primate ancestors approached being human, the less biological evolution influenced our behaviour, and the more cultural evolution took over.

This does not mean that biological evolution ended. On the contrary, it remained as important as ever. It simply altered direction. The emerging human body evolved to fit its ecological niche, to survive as a living creature. The emerging human mind now evolved to fit its cultural niche, to survive as a social creature.

We can never know for certain about our primate predecessors' cultural evolution. Unlike bone and stone, culture doesn't fossilize. Nevertheless, it is possible to make educated guesses. We can start with some assumptions:

1) Humans are biological creatures. We have all the characteristics of biological creatures, such as genes, chromosomes, DNA and RNA, cellular structure, etc..

2) We are as sensitive to our environment as any other organism. When presented with environmental problems such as lack of air, food or water, we die, just like other organisms.

3) We evolve as an adaptation to the environment, just like any other living organism. The archaeological record shows alterations in human structure and behaviour (although often the last is an educated guess) as the environment, according to geological evidence, changed.

4) Our primate ancestors behaved similarly to today's primates. Genes guide how a body develops; bodies develop to cope with the conditions in its environmental niche; we are 99.6%

genetically like chimpanzees. It is reasonable to assume we, at one time, lived lives similar to chimpanzees.

Cultural evolution began to occur during the most recent Ice Age, or within the last hundred or fifty thousand years. This is when the tools for sophisticated hunting are found; for example the spear thrower, the fully barbed harpoon, and the flint master tools that were used to make all the hunting tools. Cultural evolution took shape because human had the flexibility of mind to recognize inventions and to turn them into community property. The Ice Ages forced human to depend less on plants and more on animals, also the ice changed the strategy in which human hunted. Instead of stalking single animals, the better alternative was to follow herds and not to lose them, to learn to anticipate and in the end to adapt their habits, including their wandering migrations. It is adapting the earliest forms of hunting, because it is pursuit, where the animals go and how fast they go there set the pace of life and the geography where they lived. Also it has the later qualities of herding, because the animal is tended and stored as a mobile reservoir of food. This change from a vegetarian to an omnivorous diet, gave human more free time to spend in more direct ways. Meat is a more concentrated protein than plant, and eating meat cuts down the bulk and the time spent in eating by two thirds. Human would become totally dependent on the animal that he/she hunted, not only for food but for other products to be used for his/her livelihood.

Cultural evolution as a theory in Philosophy of Human Person was developed in the 19th century, and it was an outgrowth of Darwinian evolution. Cultural evolution presumes that over time, cultural change such as the rise of social inequalities or emergence of agriculture occurs as a result of humans adapting to some non-cultural stimulus, such as climate change or population growth. However, unlike Darwinian evolution, cultural evolution was considered directional, that is, as human populations transform themselves, their culture becomes progressively complex.

Teilhard de Chardin's Cosmic evolution

Teilhard de Chardin's Cosmic evolutionism too is all embracing and characterizes much more than living things. He contended that long before things appeared on the earth, the basic stuff of the cosmos was undergoing irreversible changes in the direction of greater complexity of

organization. This law of complexification was illustrated by the vast array of organic forms which have appeared in evolutionary history. The most recent of these forms is human being.

When viewed 'from without' by the physical sciences, human being is a material system in the midst of other material systems. But each individual human being experiences himself/herself 'from within' as a conscious being. Consciousness is thus directly identifiable as 'spiritual energy'. The physical evolution of the cosmic stuff is at as the same time an evolution of consciousness.

The more highly integrated a material system, the more developed its psychical interior will be. Thus, in the human brain an intense concentration or 'involution' of cells has led to the emergence of self-conscious thought.

Human being is now a single, interbreeding species expanding on the finite, spherical surface of the planet and still showing signs of biological immaturity. Furthermore, his capacity for self-conscious thought and the production of cultures has added a new 'layer' to the earth's surface, which Teilhard calls the 'noosphere', distinct from, yet superimposed on the biosphere. The noosphere, or 'thinking layer', forms the unique environment of human being, making him/her off from all other animals.

A movement toward psychical concentration will occur, so that the noosphere will become involved in a Hyperpersonal Consciousness 'at a point of which we might call Omega.' Here evolution will reach the terminal phase of convergent integration. The integration of all personal consciousness at Omega will be achieved through love, which forms *le milieu divin*, the spirit of Christ at work in nature.

Teilhard's concept of Point Omega is obscure, like other aspects of his evolutionism, because it is essentially the expression of a mystical vision.

Check Your Progress III

Note: a) Use the space provided for answer

b) Check your answers with those provided at the end of the unit

1) Explain cultural evolution.

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2) What is cosmic evolution according to Teilhard de Chardin?

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3.5. LET US SUM UP

Science believes that human beings are the products of organic evolution, and that an understanding of the evolutionary processes that shaped the human lineage provides the ultimate explanation to our origin. Philosophically, the problem of life's origin does not present any prominent difficulties. It is human life that characterizes human person, and it is therefore from this life that we need to depart if we wish to have an authentic comprehension of his/her being. Human life is of a sort that reaches very elevated spiritual levels, levels that one always seeks to surpass. His/her gaze is always directed forward. Therefore, his/her significance can only be grasped by discovering the goal to which he/she is directed what is the final goal of human life.

3.6. KEY WORDS

Evolution – the doctrine according to which higher forms of life have gradually arisen out of lower.

Palaeontology – the study of prehistoric life, including organisms' evolution and interactions with each other and their environments.

Mutation – discontinuous variation or sudden inheritable divergence from ancestral type.

Genetics – the science of heredity and variation in living organisms.

3.7. FURTHER READINGS AND REFERENCES

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3.8. ANSWERS TO CHECK YOUR PROGRESS

Check your progress I

1. Vitalism, Mechanism, Reductionism and Preformationism were the theories existing before Emergence theory could emerge in the interpretation of evolution.

(1). the vitalistic attribution of them to the action of a unique, undetectable life force;

(2). the mechanistic attribution of them to the operation of physiochemical laws alone;

(3). the reductionist contention that whatever has happened in evolution is at the bottom a reshuffling of certain fundamental units, which themselves remain unchanged;

(4). the preformationist contention that organic variety, diversity and complexity are simply actualizations of potentialities contained all along in living substances.

In opposition to these views the concept of emergence implies that the variety, diversity and complexity engendered by evolution are irreducible, cumulative features of the creative advance of nature. From time to time the evolutionary process has produced items the like of which had never been previously exemplified anywhere in its history.

2. Organic evolution is the theory that all existing forms of animal and plant life have descended with modification from previous simpler forms or from a single cell. Organic, or biological, evolution is to be distinguished from other phenomena to which the term evolution is often applied, such as chemical evolution, cultural evolution, or the origin of life from nonliving matter.

Slow gradual process of change from one form to another, as in the evolution of the universe from its formation to its present state, or in the evolution of life on Earth. In biology, it is the process by which life has developed by stages from single-celled organisms into the multiplicity of animal and plant life, extinct and existing, that inhabits the Earth. The development of the concept of evolution is usually associated with the English naturalist Charles Darwin who attributed the main role in evolutionary change to natural selection acting on randomly occurring variations. These variations in species are now known to be adaptations produced by spontaneous changes or mutations in the genetic material of organisms. In short, evolution is the change in the genetic makeup of a population of organisms from one generation to another. Evidence shows that many species of organisms do not stay the same over generations. The most dramatic evidence of this comes from fossils.

Evolution occurs via the following processes of natural selection: individual organisms within a particular species may show a wide range of variation because of differences in their genes; predation, disease, and competition cause individuals to die; individuals with characteristics most suited to the environment are more likely to survive and breed successfully; and the genes that have enabled these individuals to survive are then passed on to the next generation, and if the environment is changing, the result is that some genes are more abundant in the next generation and the organism has evolved.

Evolutionary change can be slow, as shown in part of the fossil record. However, it can be quite fast. If a population is reduced to a very small number, evolutionary changes can be seen over a few generations. Because micro-organisms have very short life cycles, evolutionary change in micro-organisms can be rapid. Micro-organisms can evolve resistance to a new antibiotic only a few years after the drug is first used. As a result of evolution from common ancestors, we are able to use classification of organisms to suggest evolutionary origins.

Check your progress II

Palaeontology lies on the border between biology and geology, and shares with archaeology a border that is difficult to define. It now uses techniques drawn from a wide range of sciences, including biochemistry, mathematics and engineering. As knowledge has increased, palaeontology has developed specialized subdivisions, some of which focus on different types of fossil organisms while others study ecological and environmental history, such as ancient climates. The study of fossils, gives us some evidence for organic evolution. Fossils are portions of organisms of the past ages, preserved by being incorporated in stratified rocks or in trees. The older strata of rocks give the fossils of simpler types of organisms while the more recent ones give the fossils more complex and developed types. However, the fossils record is incomplete, as certain connecting links are missing.

2. The mutation as understood today is concerned with genes, the discrete units of heredity, which occupy particular loci on the chromosomes. It tells that each gene controls a specific developmental process and responsible for the appearance of specific traits in an organism. The new science, 'Genetics,' explains that a gene represents a specific segment of the DNA molecule. The product of a gene action, in many cases, is a protein; and the developmental process in a given organism depends on specific kind of proteins produced under the instruction of a particular set of genes. A mutation in a gene often causes corresponding changes in the protein concerned. If mutation occurs in the germ cells of an organism, the change will be inherited by its off-spring.

Geneticists can, to a certain extent, see evolution occurring under their very eyes in the laboratory. A careful study of hundreds of generations of short-lived animals, such as the fruit-fly, discovers slight changes in their inherited characteristics, resulting in many new races. Some of these races may eventually differ enough from each other to be viewed as new species. These changes may happen spontaneously. In other cases, they may be induced by the geneticist himself.

Check your progress III

Cultural evolution as a theory in Philosophy of Human Person was developed in the 19th century, and it was an outgrowth of Darwinian evolution. Cultural evolution presumes that over time, cultural change such as the rise of social inequalities or emergence of agriculture occurs as

a result of humans adapting to some non-cultural stimulus, such as climate change or population growth. However, unlike Darwinian evolution, cultural evolution was considered directional, that is, as human populations transform themselves, their culture becomes progressively complex.

Self-preservation, reproduction and greed are biological imperatives. They arose from millions and billions of years of biological evolution. They are as much a part of human life as any other life on earth. However, humans are not just biological creatures. We are also social creatures, the most social on earth. The ways we deal with each other, from personal to international relationships, can have as much an influence on our behaviour as our instinctive reactions. But our societies and cultures did not spring all of a sudden. They grew and developed during millions of years of cultural evolution. And the closer our primate ancestors approached being human, the less biological evolution influenced our behaviour, and the more cultural evolution took over. This does not mean that biological evolution ended. On the contrary, it remained as important as ever. It simply altered direction. The emerging human body evolved to fit its ecological niche, to survive as a living creature. The emerging human mind now evolved to fit its cultural niche, to survive as a social creature.

In giving a spiritual connotation to the word "evolution" for a large audience, Teilhard situated the human being in a cosmos that did not spit it out accidentally but brought it to birth as its highest and greatest creation. Biological evolution, Teilhard's chief interest as a scientist and the prime barrier to faith for educated people in the century he wrote in, was no enemy of this view, but its clearest evidence. The fossil record that he spent his life studying was, for him, but the immediately tangible manifestation of a great drift toward divinity that every atom of the universe has been secretly engaged in from the beginning. Everywhere Teilhard looked in the natural world, and he spent his entire life looking at it very closely, he saw evidence of the larger spiritual world which underlay and gave birth to the material, and into which it would eventually return, in a higher, transformed condition. The emergence of human consciousness on earth was, for him, the latest and most portentous step in a process of divinization that would ultimately encompass not only all of life, but all of matter itself. The universe and all it contained would, Teilhard believed, ultimately be lifted up into a state above the matrix of space and time altogether; a state that Teilhard, following the language of the New Testament, termed Omega.