THE UNIVERSE AND MAN

By

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"A fire-mist and a planet,
A crystal and a cell,
A jellyfish and a saurian,
And caves where the cave men dwell;
Then a sense of law and beauty,
And a face turned from the clod-
Some call it Evolution,
And others call it God."

W.H. CARRUTH

THE UNIVERSE AND MAN

The Universe comprises everything in existence, whether physical or spiritual in nature. Man belongs to the physical universe because he has a physical body, but he is also of the spirit universe as he is a spirit and has a spirit body.

THE ORIGIN AND NATURE OF THE PHYSICAL UNIVERSE

> "The heavens are telling the glory of God;
> and the firmament proclaims his handiwork.
> Day to day pours forth speech,
> and night to night declares knowledge.
> There is no speech, nor are there words;
> their voice is not heard;
> yet their voice goes out through all the earth,
> and their words to the end of the world."
>
> Psalm 19.

The Study Of The Stars

It has been said, "If our earth had been so clouded that the stars were hidden from men's eyes, the whole history of our race would have been different. For it was through his leisure-time observations of the stars that early man discovered the regularity of the year and got his fundamental impressions of the order of Nature - on which all his science is founded Outline of Science," Newnes).

The science of astronomy is concerned with the largest aspects of the physical universe. Alone of all living creatures on earth, man has ventured to search out into the vast depths of space and probe into the nature and origin, not only of our sun and its attendant planets, but of the countless star systems around.

On a clear cloudless night, millions of stars can be seen in the sky. These stars are actually distant suns. They are arranged in huge clusters, termed galaxies. Our own sun, a star of moderate size, occurs in the galaxy known as the Milky Way. Round many of the stars rotate smaller bodies, like our earth, and these are termed planets. A sun with its associated planets is referred to as a solar system.

The Theological Importance Of Astronomy

The study of astronomy is of great theological importance. In all the great religions of the world, it is claimed that there is a God behind the universe, a God who is its Creator and Sustainer. Man knows from his everyday experiences that there is a cause behind every effect in his earthly environment, and scientific investigations have confirmed the universal nature of this law of causation. Hence man argues that there must be a Cause behind the whole universe, a Power which was responsible for its creation and which can be referred to as God. Thus he regards the sun, moon and stars as evidence of God's handiwork, as expressions of the Divine Spirit in matter, and as giving him an insight into the ways and workings of the Divine Mind.

Early Speculations

From the dawn of civilisation, the sun, moon and stars have kindled feelings of awe and wonder in the human mind. It has been said that "the simple contemplation of the vault of the sky produces a religious experience in primitive consciousness." Early man spent most of his life in the open. He saw the sun by

day and the moon and stars by night and must have given much thought to their nature and origin. These shining bodies, which seemed to move across the sky, were they gods or the homes of gods? Could they influence for good or ill his life on earth - his success in hunting, in tilling the soil and in defending himself from his enemies? The chief or "high gods" of primitive people are in general "sky gods."

From such crude speculations and imaginings originated the science of astronomy, although until a few hundred years ago the chief interest in this subject lay in astrological issues - the supposed effects of the stars and planets on the ways and doings of man.

The Creation Of The Universe

In the folklore and mythology of ancient nations there are many differing accounts of the creation of the earth and the stars. That of the Ancient Israelites, given in Genesis, is outstanding in its simplicity and grandeur. It appears to have been written by Jewish scribes (not by Moses, as was formerly believed) between 900 and 400 B.C., a period in which occurred the Babylonian Captivity. These scribes apparently made use, not only of ancient Jewish beliefs and traditions, but also of early Babylonian records of the Creation, the Deluge and the Tower of Babel, as the account in Genesis bears close resemblances to that of the Gilgamesh Epic tablets from the Royal Assyrian Library, which were inscribed prior to 2,000 B.C.

Most of the early astronomers and philosophers, including Aristotle and Ptolemy, believed like the writers of Genesis that the earth was the centre of the universe, with the sun, moon and stars revolving round it. This geocentric belief was not held by Aristarchus of Samos, an astronomer of the third century B.C., who claimed that the earth and other planets revolved round the sun. His views, however, received little consideration until restated by Copernicus about 1,800 years later. It can be readily understood why the claims of this early astronomer were not easily accepted. It was difficult to believe that this massive and apparently fixed and immovable earth on which they lived was actually in motion; this appeared to be contrary to all reason and to the seeming facts of everyday observation and experience. Moreover, theologians refused to accept any view which suggested that the earth was not fixed and at the centre of a universe of sun and stars. They also insisted that the universe had been created at a particular time in the past and was not only finite in time but also in space. Any ideas contrary to these beliefs were rigidly and even violently suppressed, as in the case of Bruno and Galileo. Even when it was at last accepted (in the seventeenth century) that the earth and other planets moved round the sun, it was still believed until comparatively recent times that our solar system was the centre of the universe of fixed stars.

It is now known that there are millions and millions of other solar systems in the universe and probably trillions and trillions of planets. These modern scientific findings require a conception of God and the Universe, which is grander and more vast by far than that of Genesis and the Christian theology.

The Nature Of The Universe

The universe consists of a stupendous number of huge starry clusters or galaxies, which appear to exist in groups distributed in a highly uniform manner throughout space. Our galaxy, the Milky Way, occurs in a group of about twenty-five. This is a small group compared with that known as Virgo, which contains over a thousand galaxies.

In the vast area within the range of observation by our optical telescopes, i.e., up to two thousand million light years distance, there are about one hundred million of these huge galaxies or groups of

galaxies. (Light travels at a speed of 186,000 miles a second and therefore a light year is six million million miles.) The light from the galaxies at the extreme limits of observation (two thousand million light years away) takes two thousand million years to reach the earth and therefore these galaxies appear to us as they actually were two thousand million years ago.

Each of these galaxies contains thousands of millions of stars. It is estimated that in our galaxy alone, i.e., the Milky Way, there are a hundred thousand million stars. Thus there must be billions of stars, i.e., suns, in the universe.

All the galaxies are apparently receding from each other at very high speeds. The speed of recession is proportional to the distance between them. The most distant galaxy observable by our optical telescopes is receding from our galaxy, the Milky Way, with a speed of about one-fifth of that of light. A galaxy at double the distance away will be moving at about the same speed as that of light. Beyond that point the light of a galaxy can never reach us, and it will be no longer visible by optical telescopes, no matter how great the magnification. However, there is evidence from radio telescopes that there are galaxies at far vaster distances in space. Hence it would appear that the universe is expanding at an inconceivable rate.

The Origin Of The Universe

There are various theories with regard to the origin of the universe. These can be divided into the evolutionary, and the continuous creation theories.

According to the evolutionary theory, the universe originated at a definite time in the remote past (from twenty to sixty thousand million years ago) as a single mass of electrically charged particles, the so-called "primeval atom," which was only a few million miles in diameter. This mass was unstable and, owing to the disruptive action of radioactive forces, it disintegrated with explosive violence. As a result, the primeval matter was hurled outwards into space with such great force that it continued to disperse as a vast gaseous cloud for thousands of millions of years. At a certain stage in the process of dispersion, i.e., about nine thousand million years ago, this cosmic cloud began to condense to form galaxies. According to this evolutionary theory, all the basic matter of the universe was present in the primeval atom and no more is being created. If this is the case, the average spatial density of the galaxies is gradually becoming less owing to their recession in space.

On the other hand, in the continuous creation or "steady state" theory, the primary matter of the universe is being created continuously throughout space. From this basic matter, hydrogen gas is formed which then condenses to form galaxies. In this theory, the expansion of the universe is attributed, not to the effects of an explosion of a primeval atom, but to the continuous creation of new material which subjects the entire universe to outward pressure, and thus causes it to expand in all directions and the galaxies present to move outwards or recede rapidly in space. However, in spite of this recession movement, the average density of the galaxies in space should remain fairly constant because new ones are being continuously created. Also, as there is no end to space, there must be an infinite number of galaxies.

It has been estimated that the spatial density of the galaxies in the observable universe could be maintained in this way by the creation of only a few atoms of hydrogen per cubic mile of space in the year. This may appear infinitesimal but the observable universe is so vast that it would amount to some hundred million, million, million, million, million tons per second.

In both these cosmological theories there is agreement that the universe is not static but in a dynamic state of expansion. The fundamental difference between them is that in the evolutionary theory all the basic matter and all the energy in the universe were present in the primeval atom, the creation of which took place once and for all at the first moment of finite time in the far distant past; and the universe will continue to exist until no more energy is available for the production of heat, light and chemical or nuclear change. When this stage is reached, there will be no radiant solar masses, no illuminated planets; only cold, dark bodies moving forever onwards in space. On the other hand, in the continuous creation theory, the creation of new matter is going on continuously throughout all time - past, present and future - and the new matter makes up for all that has condensed into galaxies. In this theory, there is no end to space, and finite time had no beginning and will have no end. The universe will remain, as it has always been, in a state of continuous creation. Differences may occur in the details of its structure, but it will always remain the same as a whole - hence the term "steady-state" universe.

With both theories, no attempt is made to suggest an origin for the primeval matter of the universe. Was it formed, or is it being formed, by some physical or chemical process which is capable of being investigated by scientific methods, or has it arisen out of nothing as a result of Divine creative action outwith the bounds of human understanding? Modern scientific methods are not yet, and may never be, capable of investigating the ultimate origin of the universe; there is always "a time and conditions beyond the utmost mental horizon."

Formation Of Galaxies

The basic matter of the universe, no matter the manner of its origin, appears to consist almost entirely of hydrogen, although other elements may be present from the gases and dust of disrupting stars. The density of the hydrogen is extremely low, but as the universe is in a state of expansion, the gas is continually moving outwards in all directions. This movement causes the development of irregularities and, as a result of gravitational action, the gas in each of these gradually becomes denser and denser and begins to rotate in the form of a vast disc. Thus a galaxy is formed. At first no stars are present, but the rotating movement of the disc causes eddies to occur in its gaseous matter, especially near the rim, just as small eddies occur in a whirlpool of water. The gas in each eddy gradually becomes denser until first a separate cloud of matter and then a star or sun is formed. Millions of these stars may occur in the one galaxy; our galaxy, the Milky Way, is believed to contain one hundred thousand million. Many of these stars appear to have been formed about the same time, eight or nine thousand million years ago.

The Stars or Suns

The temperature of the gas in the galaxy is at first low, but once each star is formed and begins to shrink (owing to further condensation), high pressures are created in its interior and as a result the temperature rises until it is sufficiently high for the hydrogen to be converted into helium. Then, as the temperature rises still further, the helium is changed into higher elements, e.g., iron. These nuclear processes increase in intensity with the rise in temperature and result in the generation of much energy, which is radiated from the star's surface as light and heat. With stars, such as our sun, the rate of generation of energy in the interior is the same as the rate of radiation of energy from the surface, so that the size of the star remains constant. (It is believed that the temperature of the interior of our sun is about 15,000,000°C. and of the surface, 6,000°C).

Certain large stars, in some cases ten times the size of our sun, are known as supergiants. They have a short existence as their hydrogen is rapidly converted into helium. There is excessive loss of energy by

radiation from the surface of such stars, and as a result they gradually shrink and rotate more and more rapidly until they begin to break up, steadily throwing off matter into space. The star at this stage is termed an ordinary nova. In some cases, supergiants shrink very rapidly and owing to the extremely high internal pressure and temperature, nuclear processes may be set up which, instead of liberating energy, actually require it. As a result, the supergiants collapse and disintegrate with explosive violence, ejecting far into space a vast cloud of gaseous matter consisting not only of hydrogen and helium, but also of the higher elements, e.g., the metals. These exploding stars are termed supernovae.

As the stars generally consist largely of hydrogen, it has been inferred that the galaxies observable in space by our optical telescopes are of relatively recent origin. Our galaxy may be about 9,000 million years old; it is still at an early stage in its life. It has been estimated that the hydrogen in our sun will last another 50,000 million years, so that our solar system may be said to be still in its childhood.

The Milky Way

Our galaxy is a vast disc of stars, thicker in the centre than at the rim. It is up to 100,000 light years in diameter. The huge belt of stars, which is popularly referred to as the Milky Way, is made up of the countless stars of the galaxy we see when we look along or in the direction of the plane of the disc. These stars are mostly within 50,000 light years of the earth. Owing to the presence of interstellar clouds of gas and dust, only about ten per cent of the light of the stars reaches us, and for the same reason the central region of our galactic disc is obscured.

The disc rotates like a vast wheel, a complete rotation taking about 200 million years. Thus the galaxy may have made only twenty to forty of such complete revolutions since its origin. Nevertheless, this rotation imparts to our solar system a speed of 50,000 miles an hour. (In addition, the earth rotates round the Polar axis at about 1,000 miles an hour at the equator, and it has also an orbital movement round the sun Of 70,000 miles an hour).

The Formation Of Planets

Most modern astronomers believe that the earth and other planets originated from a primeval cloud of diffuse gas and particles of dust, which rotated like a vast discshaped nebula round the sun. There is, however, great difference of opinion with regard to the origin of this solar cloud. Was it thrown off as a ring from a rapidly rotating sun, or was it acquired by the fully formed sun at a much later period owing to the latter having passed through a dense cloud of interstellar dust and gas?

As the matter in this solar cloud cooled to a low temperature, it began to condense into solid particles. Many of these particles came into contact with each other and by a process of accretion gradually formed larger and larger aggregates of matter. There was much disturbance, however. in the rotating gas cloud and as a result there were many collisions between the aggregates, causing them to be shattered into fragments again. A few which were not broken up in this way, gradually grew in size owing to the accretion of dust and fragments with which they came into contact, until they were large enough to sweep in by gravitational attraction the surrounding matter. Then they rapidly increased in size until they became planets. The formation of planets from the solar nebular matter must have taken from three to six thousand million years. All the planets must have added further to their size by gathering up the gas and dust which they encountered in their passage through space.

It is highly probable that planets are frequently formed in this way amongst the stars of the cosmos. Thus, many of the stars in our galactic system may have planets, and this may hold good for other galaxies, so that there may be millions and millions of planets in existence. They may be as countless as

are the grains of sand in the Sahara Desert. Dr. R. C. Johnson mentions in his work, "Nurslings of Immortality," that an eminent astronomer has "suggested that if God sent forth an angel to find the Earth, his task would be like looking for a particular grain of sand on all the sea-shores of the world." The astronomer apparently did not realise that spirits are not under spatial limitations.

The Moon

There are different theories about the origin of the moon. Some believe that shortly after the earth's formation, the moon was thrown off or torn from it as a result either of the rapid rotation of the earth or its close approach to the sun. Others are of the opinion that, like the planets, the moon was formed by an accretionary process from the solar nebula and being in the proximity of the earth, became attached to it, as a satellite, by gravitational forces.

The Earth

It is now commonly accepted that the age of the earth and other planets is three or four thousand million years, i.e., five or six thousand million years younger than the sun. The age of the earth is shown by the rate and degree of disintegration of the radioactive ores present in its crust also, by the rate of deposition and the thickness of sedimentary rocks, and by the occurrence of plant and animal fossils in these rocks. It is worthy of note that, according to the genealogical trees of the Old Testament, the earth is only from four to seven thousand years old. Archbishop Ussher, 1650, actually put the Creation precisely at 4,004 B.C. and this date was widely accepted by the Church until comparatively recent times, as shown by the fact that it was given in the marginal notes of many editions of the Authorised English Version of the Bible.

Until recently it was believed that the earth, like the other planets, was at first in the molten state owing to its material having been derived directly from the sun, and that its surface then gradually cooled until a crust was formed. However, it is now generally accepted that, if all the planets have been formed by the accretion of matter (probably at a low temperature) from space, the earth would have had at first a low temperature. As its matter condensed under the force of gravity, a great pressure would be set up in the interior of the mass and as a result of this and also perhaps of radioactive changes, the heat of the earth's core would rise to such an extent (according to Hoyle, 5,000°C) that the matter present would become liquid and undergo a "slow boiling process," the lighter substances tending to rise to the surface, and the heavier to sink to the depths. The outer crust of the earth, however, would remain cool throughout this period, except at weaker places where the molten rock or lava was forced up from the depths giving rise to volcanic eruptions. As the earth shrank owing to the condensation of the matter in its interior, the crust would become wrinkled into folds.

At first there would be no masses of water on the carth's surface, but ultimately water exuding from the crust or condensing from the atmosphere, would begin to gather on the surface and collect in the deeper hollows to form seas and lakes. The higher ridges would form the dry land.

As the outer crust of the earth would remain cool from the first, living organisms may have appeared on its surface at a very early stage in its existence, especially if water, oxygen, carbon dioxide and nitrogen were swept up and retained by it from the gaseous matter which it encountered in its orbit round the sun.

The Nature of The Physical Matter of the Universe

All forms of physical matter in the universe have a common origin and are essentially the same in nature. They are made up of extremely small units, termed atoms, consisting of electrically charged

particles. Each atom has a central particle, the nucleus, which has a positive charge of electricity. Around the nucleus rotate one or more other particles, the electrons. These have negative charges of electricity and may travel round the nucleus at great speeds, over 100,000 miles a second. The atom may be likened to an extremely small solar system in which the nucleus represents the sun, and the electrons, the planets. All the particles are infinitely small, and in relation to their size, the distances between the electrons and the nucleus are comparable to those between the planets and the sun. Thus the atom consists almost entirely of empty space, and this applies also to every substance in the universe as all are atomic in nature.

The nucleus, unlike the electron, is massive in character and gives almost all the weight to the atom. It may be simple in structure, having only a single particle with a positive charge of electricity (a proton), or it may be complex, consisting of several particles, perhaps of different types. With increase in the complexity of its structure, there is an increase in its mass or weight and in its positive electric charge. There is also a corresponding increase in the number of electrons which it can retain rotating around it, as there must be always sufficient electrons to neutralise its positive charge. Although - all electrons are similar in nature, atoms differ in their chemical properties according to the number and arrangement of electrons present.

Atoms occur as a rule in combination with other atoms to form molecules. If all the atoms in the molecules are of the same type, the substance is termed an element. There are about ninety-two different types of atoms and therefore elements in the world. These elements can in general be arranged in a regular series according to the weight of their atoms and the number of electrons present. The element hydrogen has the simplest and lightest atom. It has a simple nucleus and a single electron. The heavy metals, e.g., gold, mercury, lead and uranium, are at the other end of the series. Their atoms have complicated nuclei and large numbers of electrons.

Different types of atoms (i.e., atoms of different elements) may combine to form the molecules of a compound. In some cases they can combine in more than one proportion, giving rise to different compounds. There is a vast number, hundreds of thousands, of compounds in existence.

The carbon atom can link up with other carbon atoms and such linkages can combine readily with the atoms of other elements, especially hydrogen, oxygen and nitrogen. As a result there are countless carbon compounds or, as they are termed, organic compounds in existence. The living principle of animals and plants in earth-life has made use of this combining property of carbon for the development and maintenance of the tissues of the physical body. These tissues consist of organic compounds.

Accordingly, all the physical matter of the universe consists essentially of electrically charged particles. These particles make up the atoms and the latter under certain conditions unite in definite proportions to form all the vast range of substances in existence. Hence there is a fundamental unity running through all physical matter, and a system of law and order in the changes which it undergoes at any time.

The simplest element is hydrogen. It is not known how it originated in the universe, but it is possible that it is formed from some primary stuff present in space. However, nothing is known as to whether such basic matter actually exists. At the high temperatures prevailing in certain stars, hydrogen becomes converted into helium and this, under certain conditions, undergoes further nuclear changes with formation of higher and higher elements until ultimately the heavy metals are produced. It has been claimed that there is nothing haphazard in this series of changes, but that it is the result of a definite evolutionary process showing evidence of Purpose and Design.

Modern Science and Man's Conception of God

A study of the physical universe broadens man's conception of the Almightiness of God. In all ages, man's views of God have been based largely on his ideas of the universe. The spectacle of the skies by day and night - the rising and setting of the sun and moon, and the apparent movement of the stars - must have caused primitive man to speculate vaguely as to the nature and origin of these heavenly bodies. In his mind there would gradually develop the idea, perhaps dim at first but becoming more definite later, that there must be a Cause behind it all, some Almighty Force which had brought it into being and which continues to sustain it. And early man, from a knowledge of his own creative powers, conceived of this Almighty Creative Force as a Divine Person - a God in human form. But to him this God, although Almighty in that He had created the universe and still ruled over it, was only a little higher in His personal traits than man himself. He was swayed by the same emotions and passions as man. He could enjoy walking in a garden in the cool of the evening. He could be jealous and capricious in nature and become angry when man was disobedient. He could even be argued with and threatened on occasion.

Accordingly, the God of most theologies throughout the ages was a very human God, not far removed from ordinary man in character and temperament. This narrow conception of God was based largely on the supposition that the earth was the centre of the universe, and that the whole universe was created primarily for the life of human beings on earth - a belief held until the beginning of the present century.

In recent years man has had to revise his ideas about the size of the universe. He now knows that the earth is really one of the smaller planets of a relatively small solar system, which is part of a huge galaxy containing one hundred thousand million stars or suns. Our sun is situated far from the centre of the galaxy and ranks merely as a star of moderate size and of rather less than average brightness. It is probable that many, if not most, of these other stars have planets. Also, far out in the depths of space, there are millions of other enormous star clusters, like our galaxy, in course of evolution, each with its millions of solar systems and millions and millions of planets. This new knowledge is bound to make man alter his ideas of the Almighty Power, commonly referred to as God, behind the Universe. The old theologies - Hetrew, Christian and others - will have to be readjusted in the light of the new cosmology to admit of a far wider conception of God.

A systematic examination of the stars shows that they are distributed in no haphazard fashion. They occur in huge clusters or galaxies which are arranged in a highly uniform and orderly manner throughout space. There appears to be a design and purpose behind all this. Further, the countless stars and their attendant planets which make up these galaxies, are apparently governed by definite laws. As a result, their movements are regulated so that their positions at any time, past, present or future, can be more or less accurately determined. These facts indicate that the Almighty Power or Being, who was responsible for the creation of all these star systems, is a God of purpose, law and order.

This is also borne out by the essential unity in the constitution of all forms of matter in the physical universe. The countless physical and chemical changes which occur in such matter are all governed by definite and immutable laws so that these changes proceed in a precise and predictable manner. There is nothing haphazard in the response of electrical particles and atoms to the natural forces acting upon them at any time.

Thus a knowledge of the physical universe is of great importance in forming any conception of God. All forms of matter, whether electrical particles or huge star systems, are expressions of the Infinite. They tell of His ways and methods, and show that there is a purpose and design in all His activities. They reveal that there is a Divine Mind at the heart of all things.

What is now known about the stars shows that the popular conceptions of the Almightiness of God bear no relationship whatsoever to His Power as displayed in the utter vastness of the star systems in space; it is quite impossible for man to apprehend the Power responsible for the creation and sustenance of the seemingly boundless Universe.

THE ORIGIN AND EVOLUTION OF LIVING ORGANISMS ON THE EARTH

"Life sleeps in the mineral, stirs in the vegetable dreams in the animal and awakes in man."

The Origin Of Life

On the assumption that the crust of the earth was at first in a molten condition, it was commonly believed that the first forms of life appeared in the warm primeval seas about one thousand million years ago. However, if the crust was cool from the first, as is now widely accepted by astronomers, it is probable that the dawn of life in the world was at a much earlier period; in fact, carbonaceous residues, believed to be from primitive algae (seaweeds) and bacteria, have recently been found in ancient rocks, which indicate that the dawn of life on the earth may have been as far back as 3,000 million years ago, i.e., at the time when water first began to collect on its surface.

No one knows how the first forms of life originated on the earth or what precisely was the nature of these primitive organisms. The most rudimentary and smallest forms of life known at the present time are the viruses. In certain cases they apparently consist of little more than a nucleo-protein molecule, and some are crystalline in nature. It is doubtful whether some are actually living organisms, being apparently on the border line between animate and inanimate matter. But, they can hardly be regarded as representatives of the most primitive forms of life as in all cases they are parasitic on plants and animals.

From early times, there was a general belief in many nations: Greek, Roman, Hebrew and Arab, that new generations of all kinds of plants and animals were continuously being created in rivers and the sea, and from the mud of swamps and from dust. The Creation described in Genesis was but the same process on a grand scale. This belief in spontaneous generation was widely held even in European countries, including Britain, until a few centuries ago, as shown by writings in the seventeenth century on the creation of mice from wheat stored in barns, of maggots from meat or of insects from manure heaps.

It was found in the seventeenth and eighteenth centuries that when foods and other organic substances were protected to prevent access of insects and animals, these organisms did not develop in the material. Hence it became generally accepted that spontaneous generation did not occur in the higher forms of life, although many biologists still believed that it might occur in lower organisms, such as bacteria, and these might later develop into higher organisms. About a hundred years ago, Louis Pasteur showed that under laboratory conditions spontaneous generation did not occur even in the case of bacteria. This left the question as to how life originated in the world still unanswered.

Lord Kelvin and others suggested that living organisms, perhaps in the form of spores, may have been carried to the earth in cosmic dust or in the fissures of meteorites. This theory only transferred the question of the origin of life from the earth to some other place in the universe. The spores of bacteria have great powers of resistance to adverse conditions and may live for years in a dormant condition in absence of water and at extremely low temperatures (conditions likely to be present in interstellar dust), but for the active existence of all known forms of life, water in the liquid state and temperatures above freezing point are essential.

Another theory of the origin of life on earth is based on the possibility that under certain natural conditions highly complex carbon compounds, i.e., organic substances, may be formed by ultra-violet rays or catalytic or other agents, from carbon dioxide, water and ammonia. (Some of these organic substances have actually been synthesised in the laboratory by purely physical or chemical processes). The surface water of the primeval seas would be brightly illuminated and well aerated, and the shallow water near the shore would contain an abundance of mineral matter. Thus the conditions might be favourable for the formation of these organic substances, and in the absence of any form of life to use them as food, they might accumulate and become highly concentrated in the water. Such an environment might provide ideal conditions for the generation of living organisms. However, no one has succeeded as yet in causing such tomplex carbon compounds to acquire the properties of living matter or protoplasm, but for all we know it may occur at the present time under natural conditions, e.g., in the sea.

The Living Principle

No one knows what constitutes life. Is it a vital activating principle generated within certain forms of organic matter as a result of the action of various conditions, or is it a principle which is taken up by the organic matter from extraneous sources? Many scientists even refuse to accept that there is such a principle, but are faced with the difficulty that for some reason, which they cannot explain, animate or living organic matter has certain characters, e.g., reproduction, nutrition and growth, which inanimate organic matter under no circumstances can be made to show.

It is a belief common to all the world's great religions that there is this vital principle or source of energy in all living organisms, plant and animal, and that it is inherent in the spirit of each; as God is Spirit, it is also a character of His Divine nature. Further, as God is the Creator and Sustainer of the universe, there must be throughout it an infinite and all-pervading supply of this Vital Principle. Under certain conditions this may cause various complex forms of inanimate organic matter, e.g., nucleoproteins, to develop into extremely rudimentary living organisms. Whether these conditions may arise in the world today and thus enable spontaneous generation of life to occur has never been proved by experimental methods.

Quite apart from the question of whether spontaneous generation may occur or not, one can readily understand that all living organisms which are already in existence can renew their vitality throughout their lives by absorbing and retaining the vital energy from this Universal and Infinite supply. Certain facts indicate that there is this source of power. For instance, the renewal of vitality during sleep is not due merely to the resting of the body and the brain. There is also the sustaining effect of prayer and meditation in which the mind is brought into attunement with higher spirit forces; and the curative effect of psychic treatment of disease.

The Evolution of the Higher Organisms

The first forms of life would be very simple in nature, consisting of minute unicellular (single-celled) structures. From these earliest types all other living organisms were evolved. The theory of how this occurred, namely, the theory of Evolution, was developed largely as a result of the work of Lamarck, Charles Darwin and Alfred Russel Wallace. According to this theory, the descendants of the first group of primitive organisms have undergone in the course of some two or three thousand million years a progressive series of changes in form and structure to give rise to all the species of plants and animals, including man, now in existence.

The general truth of evolution is now accepted by practically all leading biologists and is shown by the following facts:- (1) The simplest forms of life in the world at the present time, i.e., unicellular organisms, are linked with the highest forms of plants and animals through a large gradation of types which in structure are definitely related to one another.

(2) The fossilised remains of various kinds of plants and animals found in the rock formations of the earth's surface, show a definite succession of evolving, yet related, types of living organisms in the past. Enviromnental conditions throughout the ages have had a definite influence on the development of the new types. This has to some extent been responsible for the typical flora and fauna found in different parts of the world, e.g., Australia, Central Africa, Brazil and the Polar regions.

Important confirmation of the theory is also shown by the fact that in man and the higher animals, the evolutionary history is recapitulated by the developing embryo of each individual. At first the embryo consists of a simple cell like that of the earliest unicellular organisms; then it develops tissues similar to the muscular structures of the earliest aquatic animals. At a later stage, the embryonic heart and system of blood vessels resemble the heart and circulation system of the gills of fishes; only to be modified later to the heart and lung circulation, typical of land animals and man. These embryonic structures are similar, not so much to the actual corresponding structures of the adult ancestors as to those of the embryos of these ancestors. For instance, the embryo mammal has gill pouches which resemble more closely the gill pouches of the embryo fish than the fully developed gill slits of the adult fish.

Evolution is a process which is going on continuously, with the development of new types of plants and animals. Many of these new types may be unable to persist under the conditions of their environment and in face of competition with other organisms, and as a result die out. Other types may be able to persist in the environment and then evolve further. Since the dawn of life there has been on the whole a gradual progress upwards; birds and mammals in the present age are more highly developed in body and in brain power than their far distant ancestors. As will be shown later, evolution tends to lift organisms upwards to a fuller sense of awareness and a greater freedom of expression and of will; also, a greater reasoning power and a greater sense of personal responsibility. The advance in itself shows a directive power behind the process.

The Earliest Forms Of Life

The earliest organisms would be very simple in their mode of life, feeding on the organic substances already elaborated in the sea by purely physical or chemical processes. At an early stage certain organisms might be evolved, which could utilise the carbon dioxide and perhaps the ammonia of the atmosphere, and the mineral salts in solution in the water, and build these up into the organic compounds of their cell substance. They would obtain the energy for this process from the oxidation of ammonium compounds, sulphides or other oxidisable substances present in their environment. Thus

these organisms would be similar in their modes of nutrition to certain soil and water bacteria of the present time.

All these primitive organisms, being unicellular, would multiply by simple cell division or fission, the single cell of the organism dividing to form two independent daughter cells. This is a very rapid method of reproduction, so that there could be several new generations of organisms in the course of a few hours or even in an hour, and innumerable generations in a week. In the countless organisms, which would be produced in this way, variations would arise in form. structure and mode of life, and all these variations would be subject to the selective action of environmental conditions. A certain type or variety of organism would tend to persist or to die out according to whether a new variation in its cell structure or mode of life was beneficial or useless to it.

The Differentiation Of Plants And Animals

Modifications would also soon arise in the modes of nutrition, and this would ultimately lead to the great division of living organisms into plants and animals. Thus certain organisms by producing the green colouring substance, chlorophyll, became adapted to usu sunlight as a source of energy. This enabled them to utilise in their nutrition entirely inorganic substances, namely carbon dioxide, water and minerals. From these green unicellular forms of life all species of plants were evolved. Other organisms never became adapted to feed in this manner, but used for their nutrition only preformed organic matter, e.g., that of other organisms, dead or alive. Some of these organisms remained simple in their mode of life and developed into bacteria bringing about changes, such as putrefaction and fermentation, as at the present day, but others evolved further and developed into animals.

The Earliest Multicellular Organisms

Many of the early unicellular organisms would occur singly in the environment, but others would occur in chains or clusters owing to the cells after cell-division remaining in adherence. Each cell in these aggregates would as a rule retain its independent nature. In certain cases, the cells might become to some extent interdependent; there might even be a certain amount of division of labour in the aggregate, certain cells becoming specialised to carry out particular functions, e.g., reproduction, feeding, growth, locomotion or fixing the organism to some surface. This would constitute an important step forward in the evolutionary scale; it would be the first step in the development of a multicellular body.

These earliest multicellular forms would be freeswimming in the water, or would become fixed to rocks. They might be somewhat similar to the present Higher Bacteria or certain Algae (seaweeds). At first their multicellular bodies would be very simple in nature, but with the passage of millions of years they would become more and more complex until finally the massive and highly complicated bodies of the higher plants and animals were evolved.

Backboned Animals Or Vertebrates

At first all the animals were backboneless or invertebrate in type, like sponges, jelly-fish, Molluscs and worms, but after some five hundred million years, vertebrates (backboned animals) in the form of true fishes, breathing by means of gills, appeared in the seas. The development of a backbone and other bony structures gave the organisms certain advantages, which were to be even more fully exploited at a much later period when their descendants left the seas and invaded the dry land. These skeletal structures provided support for the body cells and helped to retain the shape of the body. They protected the delicate internal organs, gave rigid attachment for the muscles and acted as levers for muscular action. Without the skeleton, the animal would not be capable of the rapid and precise

movements it can carry out in the sea or on the land. Fishes are expert at moving freely through their watery environment. Their eyes are well developed, the vision being sharp, especially for moving objects, but they have no eyelids and cannot therefore close their eyes.

Land Plants

About the same period as the true fishes were evolved (about five hundred million years ago), plants from the sea invaded the land surfaces. These terrestrial plants developed roots, stems and leaves, but were flowerless as they reproduced by spores and not by seeds. Before plants became established on the dry land, there would be few or no living organisms there, except perhaps for bacterial or seaweed types living in moist places near the shores of seas and lakes. The early land plants would require plenty of moisture and so would take longer to become established in very dry areas. Hence the main land surfaces would be at first bleak and desolate, completely bare of vegetation. Even after plants had become established on the land, there would be no flowering plants or grass until millions of years later.

Land Animals

The growth of terrestrial plants prepared the way for the invasion of the land at a much later period by animals from the sea. These animals had become adapted to use air for respiration, and included invertebrates, such as worms, centipedes, spiders, scorpions and insects; and vertebrates, such as lung-fishes or mud-fishes. These lung-fishes had lungs as well as gills, and so could live both on land and in water. This was a great advantage when they lived in pools which might become dried upin fact, the lungs may have been developed in the first place to meet this contingency. The lung-fishes were an important stage in evolution as they were the ancestors of the amphibians, reptiles, birds and mammals.

Flowering plants would begin to appear about this time and as the vegetation would be swarming with insects, cross-fertilisation of plants by these organisms would be possible.

Aquatic creatures gained many advantages by invasion of the land. The new environment enabled them to carry out a higher mode of life with much greater prospects of further development. The move to invade the land may have been due to some extent to curiosity (a common dait in animals) or to the urge for adventure; it may have been necessary owing to the shallow pools, in which they were living, becoming dried up or overcrowded with creatures; or it may have been to escape from enemy or predatory types. The terrestrial mode of life would also enable the creatures to obtain more oxygen, but as oxygen could not be absorbed readily through a dry hard protective skin, lungs had to be developed so that the oxygen could be absorbed by the blood through a moist internal surface. Insects for the same purpose developed air tubes instead of lungs.

Life on land involved for most organisms the production of legs for locomotion and for raising the body from the ground; and to facilitate movement, the body became more compact. As a protection against injury and extremes of heat and cold, the organism acquired a hard, tough skin, covered in many cases with hair or fur. The eggs had to be deposited in a safe place (not so easy as in aquatic life), or carried in the body until the embryo had fully formed. Moreover, for safety and for the supply of food, the organisms might adopt an arboreal mode of life, or invade the air, burrow underground, or even return to the sea. But some of these changes in mode of life occurred only at a much later stage in evolutionary history.

As amphibians became adapted to life on land, they gradually lost their gills (gill pouches or rudimentary gills occur in the embryos of all reptiles, birds and mammals, including man), but evolved

lungs and a more highly organised heart. The paired fins of the true fishes became replaced with limbs having fingers or toes for feeling, holding and grasping objects, including food. The tongue became movable; and eyelids, eardrums and vocal organs were developed. These air-breathing amphibia would be the first creatures of any kind to utter true vocal sounds. They would produce at first mainly mating, and then also maternal and infantile calls, and later perhaps sounds' expressing pain, fear, rage or pleasure. The use of the fingers and toes for feeling and holding objects, and the employment of the vocal cords for the utterance of various sounds had an important influence in the development of the brain.

Reptiles And Birds

From a relatively small and primitive group of these amphibians, reptiles were evolved. The latter were capable of living entirely on dry land and were an important advance in evolution as they could carry out a much wider range of activities than their amphibian ancestors and had a more highly developed brain. From them, tortoises, lizards and snakes were developed and, most important of all, birds.

In the evolution of birds, a group of small lizard-like reptiles, too weak to maintain themselves against their enemies on the ground, sought refuge in the trees. After ages of this arboreal life, they became adapted to glide from one tree to another or from the tree to the ground, and then gradually, and probably through many intermediate forms, they acquired the power of sustained flight. Mastery of the air gave birds great advantages. They could readily escape from their ground enemies; they could range much more widely for food and water; they could nest and rear their young in safe places, and they could migrate from one country to another at different seasons to avoid extremes of climate. The power of flight enabled birds to spread rapidly over the earth and become an important group of animals.

There have been in the past four successful invasions of the air by animals:- insects, pterodactyls (now extinct), birds and bats. Each solved the problem of flight in a different way. In insects, the wings consist of light, hollow, flattened sacs, which grow out from the body and in flight are kept in rapid motion by powerful muscles. Pterodactyls and bats produced wings of specially developed folds of skin, which stretched between the limbs and the body. In the case of birds, the power of flight is based on feathers, which cover the fore-limbs to form two coherent vanes or fans for beating the air and thus propewng the creature forward. The feather is a unique feature of birds. It is not only required for flying, but it protects the body from injury and keeps it warm. The covering of feathers also encloses a layer of air over the body surface and so enables birds. such as gulls, ducks and geese, to float high in water and swim more readily. Birds show other characters associated with the power of flight, e.g., lighter and more porous bones containing air cavities; a more compact and stream-lined body; specially formed fore-limbs with very powerful muscles to move the wings; large heart for rapid circulation of the blood to carry plenty of oxygen and food to the muscles. The breast bone has a deep keel for the adequate insertion of the heavy wing muscles; and the dorsal vertebrae have become fused to give a firm basis for the movement of the wings. The tail has become short and bears a fan of feathers.

Birds are bipeds using only their hind limbs for walking or hopping. The fore limbs are devoted almost entirely to flight, and cannot be used for feeding so this operation has to be done almost entirely by the mouth (sometimes assisted by the feet), using a hard beak and a long highly flexible neck. Associated with their mastery of the air, are keen senses of sight and hearing, and an alertness of rriind and body, giving a life full of zest and spirit.

Mammals

Another group of reptiles after long ages evolved into mammals-animals with mammary glands, a coating of hair on their skin, a highly developed brain, and limbs which enabled them to carry out a wide variety of actions, some of which entailed the use of great skill, e.g., grasping and holding. The mammals became specialised for different modes of life-on the ground, in the trees, below ground, in the rivers and lakes, and in the air (bats). Many developed highly specialised limbs, as in the case of the ox, the horse, the elephant and the whale. One group of small creatures, to enable them to survive, took to the trees and were able to persist without losing the five digits on each limb originally possessed by their ancestors, the fishes and amphibians. And it was these limb structures, which, once the brain had developed sufficiently, enabled them to carry out skilful and precise activities, and thus acquire valuable information and experience of their environment. The fact that this group had delayed specialising their limbs until a relatively late period, when the brain had become much more highly developed, was to give them a great advantage over other animals; in fact, it was from this group that apes and man were evolved.

Arboreal Creatures and Man

Man is at the highest point in the scale of evolution. He is a recent corner to the world as he has been in existence only a mere fraction of the time since the first organisms appeared. His ancestors sixty million years ago were lemur-like animals which lived in trees. This arboreal mode of life was particularly suitable for man's ascent from the animal world. In the first place, life in the trees led to the eyes being shifted from the side of the head (where they looked sideways) to the front of the face, and becoming directed forward. Thus the animal could observe and appreciate depths, i.e., it had stereoscopic or three-dimensional vision. It was therefore able to estimate distances and thus to judge the strength of the leaps it would require to make in jumping from branch to branch. Defective vision would be disastrous to an arboreal creature. The ears, unlike the eyes, did not move forward, but retained their lateral position on either side of the head. This was an advantage, as the head acted as a screen between the ears and so provided for binaural hearing.

Another feature, which was developed as a result of this tree-dwelling life, was the first digit of each fore-limb became a thumb, which could be worked independently of, or in opposition to the fingers. Thus the animal could grasp firmly objects, such as the branches of trees. At the same time, the hand acquired a more delicate sense of touch and so became more useful in its ability to appreciate the shape and nature of the object grasped. A keen sense of touch is essential in arboreal creatures for the skilful and delicately adjusted movements of their bodies. An erect posture was also acquired to relieve the hands from the work of moving the body from place to place. Man differs from animals in that he can stand bolt upright.

The possession of forwardly directed eyes led eventually to the reduction of the size of the nose or snout, so that an unobscured field of vision was obtained. The smaller nose was responsible naturally for a somewhat diminished sense of smell. To compensate for this, the sense of hearing became more acute, especially in the ability to discriminate between different sounds, a faculty which led eventually to the development of speech. The brain is the organ which distinguishes to the greatest extent man from animals; and the increased sense of vision and also to some extent that of hearing, were largely responsible for the enlargement and development of the brain and thus for the evolution of man. In this connection it must be remembered that the brain is the instrument through which the mind expresses itself, and the more highly developed the brain, the more efficient and sensitive an instrument it is. As the brain developed, so also did the ability to control and direct the actions of the body and at the

same time there was a wider range of awareness of enviromnental conditions. Also, the power of speech was gradually acquired. At first, the speech would consist largely of sex, parental and infantile calls; or sounds expressing pain, pleasure, fear or anger; or recognition signals, especially at night or in a forest. Then man would develop sounds or words for food, home and so on. In this way a vocabulary would gradually be formed for use in conversation.

Thus the peculiar conditions of a group of animals, takin to life in the tree-tops, has led to the evolution of monkeys (including the manlike apes) and man. The two groups were evolved from a conunon stock of arboreal creatures, but on independent lines. The human body is very similar to that of the anthropoid ape, e.g., the gorilla or chimpanzee, and the fact that man is akin to the anthropoid ape is shown by the close relationship in their blood reactions compared with those of other mammals.

The earliest human beings of which we have any knowledge lived about one and three quarter million years ago, so that it has taken about two or three thousand million years for man to be evolved from the first forms of life. In his physical characters: strength of body, fleetness of movement, senses of hearing and smell, he is markedly inferior to many animals, and, of course, he is incapable of flying and his swimming powers are limited; but his highly developed brain and his dexterity in the use of his limbs, especially his arms and hands, has enabled him to climb higher in the evolutionary scale than all the other animals.

The Development of The Mind

Animals in general have shown in the whole course of their evolution, not only a certain awareness of the conditions around them, but also an urge to adapt themselves to these conditions by learning to carry out efficiently useful or needful activities and to suppress those that are useless. The knowledge thus acquired has frequently become in the course of many generations an inborn or inherited trait, as in the case of birds knowing how to build their nests. These inherited traits may be responsible for the simple responses of the brain and nervous system to sensory impressions, or for the more complex types of behaviour which are said to be instinctive in nature. Speaking generally, such instinctive behaviour becomes ot less importance in the life of the animal as it ascends the evolutionary scale.

The Mind of Lower Animals, Fishes and Birds

The lower animals, e.g., insects, such as bees and ants, are richly endowed with specialised instinctive powers, but they do not as a rule learn readily from experience and are therefore said to be of low intelligence. Thus they know instinctively how to conduct their lives under normal conditions, but if subjected to new or unusual circumstances, they have only low powers of adaptation.

Fish also are largely governed by their instincts and their responses to sensory impressions, but they may rapidly learn to make use of beneficial sensory associations and to discard useless ones. They are, however, of low mentality; in fact, a high degree of intelligence is not required for their mode of life, because as a rule they can readily procure their food and do not require to take any special steps for the care of their offspring, their prodigious powers of multiplication compensating for a high infantile mortality.

Reptiles have a more highly developed brain than their ancestors, the fish and amphibia. They are more sensitive and adaptive to external influences and show a higher mentality in their behaviour.

Birds are still more intelligent. In their activities they are not so dependent on their instincts and have an alert mind which in many cases can be educated. With their powers of flight they lead an active life. They are highly emotional, expressing their feelings in their songs.

The Mind of Mammals

Manunals, the highest order of animals, are less instinctive in their behaviour than lower animals and are much more intelligent. Thus they have a much higher capacity of learning how to do things or of acquiring knowledge from experience, i.e., they are more educable and more adaptive in nature. They also take a greater interest in their surroundings and may readily make mental associations in response to sensory stimuli. They may be even experimental in their activities, especially in their play. The horse, dog, cat, elephant and monkey are amongst the most highly intelligent of these big-brain types, but even they show a lower mentality than one would expect from the size of their brains, as their minds are concerned largely with sensory impressions or perceptual influences (what they see, hear, smell, taste and feel), and with the thoughts associated therewith. They appear to have little or no power of reasoning. They seem to be well fitted for, and contented with the circum stances in which they live and have little urge to experiment or learn new ways of life. Although much less instinctive in their activities than are the lower animals, nevertheless, even with them, much of their behaviour is basically instinctive in nature, being determined by hunger, sex, maternal affection for the young, and fear of their hereditary enemies.

The dawn of mind is more evident in monkeys than in other mammals. The former are alert, quick in their powers of perception, are expert at manipulating their fingers and toes and co-ordinating these with their eyes. They are always active, curious and ready to explore and make experiments, but in spite of these indications of intelligence there is little evidence of reasoning power.

The Human Mind

On the other hand, not only can man make inferences from what he perceives of the world around him, i.e., from his sensory impressions or perceptions (as can certain animals), but he has, in addition, reasoning powers. Thus he differs from animals in that he can draw conclusions from general ideas or concepts. He is also in every way more capable of solving problems, recalling readily for this purpose past knowledge and experience. Although the instincts, which he has inherited from his animal ancestors, still play an important part in his activities or behaviour, their effects may be modified considerably according to circumstances. An important factor in his advance of mentality has been his power of speech and later his ability to write. This has enabled him to discuss and compare his experiences and ideas with other men; also, to pass on to others what he has learned from his forebears, and any original knowledge of his own. Animals, owing to their lack of power of speech, have been unable to acquire or pass on knowledge in these ways.

Finally, it may be said that although with animals in general there has been a gradual advance in mental fitness since the dawn of life on earth, in man evolution has also brought about the power of reasoning, a fuller sense or range of awareness, a greater degree of self-control and a sense of personal responsibility. For these reasons, man is by far the highest expression of life on earth.

The Directive Power Behind Evolution

The facts of evolution are clear; the higher plants and animals have undoubtedly evolved from primitive unicellular forms of life. But it is not known what initiated the process of evolution, and what is responsible for the urge behind it and which sustains it. It has been claimed that the process can be accounted for by physical or chemical factors or by powers of adaptation alone. There is no doubt that variation in itself, disciplined by the current environment, would automatically have led to evolutionary advance throughout the vast ages at the disposal of the process. Nevertheless, it is difficult to conceive how such a process, with its tendencies for the development of higher forms of

consciousness and greater states of awareness, can be entirely accounted for by the physical and chemical properties of substances, no matter how complex in chemical nature these substances may be. After all, the other phenomena of life can not readily be accounted for on a purely physical or chemical basis. In fact, no biologist knows what constitutes life, or in other words, what is responsible for an organism, whether plant or animal, being alive.

Against the purely materialistic conception of evolution it may be said that there are indications of a Directive Power in evolutionary advance. There is evidence of purposive and experimental features, which can be taken as an indication of a Master Mind or Planner. Thus in the past ages, many types of plants and animals were evolved, which could not maintain themselves indefinitely in the changing environmental conditions of the earth and died out, as in the case of the giant reptiles of the Mesozoic Period, e.g., the dinosaur. Such failure-lines were not repeated. On the other hand, the types which could persist, were frequently evolved further and new types formed from them. The dying out of the failurelines was no doubt due to the elimination of unsatisfactory types by natural selection, but one has still to account for the origin of the property of living matter (mutation) to develop new types, and the urge behind it to develop further the successful types.

Further evidence of a Planner behind the process of evolution is shown by the development of highly specialised and complex structures, such as the eye and ear, in which difficult problems with regard to vision and hearing had to be solved. No doubt there were many transient intermediate forms in the long ages before the organs reached the final stage, but it is difficult to believe that such a complicated series of changes as was necessary in these cases could have occurred in a purely fortuitous manner. Further, at certain stages in evolution, when animals have made a complete change in mode of life, for example, when aquatic animals first invaded the land or when land creatures invaded the air, a complicated series of changes, some of a major nature, had to be made as already described, to enable the animals to live in the new environment. All these evolutionary changes had to take place before the organism could deal adequately with the new form of environment. Although there must have been many transient intermediate forms, for example, lung-fishes bridging the aquatic-amphibian gap, yet there must have been some definite mental conception of the ultimate form necessary; there must have been a Planner behind it all.

The Master Mind behind evolution is also shown by the exquisite artistry and beauty of design, colouring and structure of many forms of life, for example, the brightly coloured flowers with their perfumes, the birds with beautiful plumage and remarkable powers of song, the insects, such as butterflies, with marvellous colouring. Mechanistic, purely chemical or physical factors or powers of adaptation alone, cannot account for such characters there must have been a Directive Power behind all.

It may be claimed that it has never been proved that there is such a thing as Spirit, or that there is a Directive or Spirit Force responsible for the urge behind the process of evolution and for its direction and control, but even materialists must admit that in the “something” which is known as “life,” there appears to be a tremendous force to survive, multiply, vary and in many cases advance to more highly developed forms; yet they have never been able to say what is responsible for this force.

THE RISE OF MAN

“What is man, that thou dost make so much of him, and that thou dost set thy mind upon him.” job 7. 17.

Primitive Man

The first human types appear to have evolved within the past two million years. At an early stage, primitive man left the forests and, like the horse, ox and deer, took up life in the more open country which by that time was becoming covered with grass. This change in mode of life may have been caused by the desire for more freedom of movement, or it may have been forced on him by the shrinkage of the forests, perhaps as a result of increased dryness of the climate or the destruction of young trees by animals. In the new life on the ground he retained his erect posture, and the hands, which were originally adapted to grasp branches, were now available for holding sticks, flints and stones,' which he was gradually learning to use as weapons and tools. The manipulative skill thus acquired had an important educative effect on the developing mind.

At first man would lead a life very similar to that of wild animals. There would be a merciless struggle for existence in which as a rule only the fittest would survive. He would be weak compared with many animals and so would have to rely on his intelligence for his protection. Like animals, he would be controlled largely by the needs of his body, e.g., hunger and thirst, and by his instincts, especially those of self-preservation, fear, sex and curiosity. He would spend most of his time in searching for food and in hunting. To protect himself from the weather and from his enemies, he would live in rock shelters or caves.

Early Progress

He appears to have been gregarious in his habits, usually preferring to live in family groups or in small communities rather than to lead a solitary life. Living in such groups provided him with more protection from human enemies and wild beasts. At the same time, it brought about a certain amount of division of labour, the most able-bodied men taking on the duties of hunting and fishing, and the women and old men attending to the children and the homes. (Even the lower animals, e.g., ants and bees, may live in colonies for mutual assistance and protection; and individuals in these communities may make sacrifices for the common welfare).

The communal life and the development of a common language enabled individuals to discuss and pass on any new information or experience and thus fostered the growth of knowledge. All this also promoted a feeling of kinship or fellowship among the members of the group and taught them to be less self-centred. The education and training of the children in the traditions and customs of the community would play an important part in raising the general standard of knowledge and behaviour.

At an early stage man discovered the use of fire and made use of undressed flints and stones for tools. Later he began to make tools by breaking off pieces from a flint or stone until it was of the required shape (core tools), or by chipping off flakes from it until a flake with a cutting edge was obtained (flake tools). These tools, although roughly dressed, were frequently skilfully made, even in the case of Neanderthal man who lived as long as two hundred and fifty thousand years ago. In addition, early man made spears of wood, bone or horn.

Modern Man

The early human types, including Neanderthal man, did not persist, and modern man has sprung from a later offshoot of the original humanoid stock, which seems to have appeared from thirty to fifty thousand years ago. At first, modern man's stone implements were roughly dressed (the Palaeolithic period), but later he learned to polish them (the Neolithic period). With further progress the stone tools were replaced by copper or bronze implements and then by iron. At an early stage he made boats and

discovered the art of pottery. Later, he learned to spin and weave and made a great step forward by inventing the wheel.

Man at first acquired knowledge very slowly. He preferred to follow traditional practices rather than to experiment and initiate new ones. But each new discovery or invention increased his range of knowledge and frequently proved the basis for further advance. Moreover, with increase in knowledge of the use of tools he was able to improve the primitive conditions under which he lived. Instead of having to adapt himself, like animals, by evolutionary changes to his environment, he could now modify its conditions to suit himself.

At first he obtained his food by collecting fruit, shellfish and vegetation, and later by hunting and fishing. Less than ten thousand years ago to meet his requirements better, he domesticated certain animals, e.g., the ox, sheep, goat, camel and horse, and started to grow grain crops and fruit trees. He then developed the practices of agriculture and the milling of grain for food.

As life became less arduous, man became more interested in personal comfort and appearance. He used skins and fibres for clothing and for furnishing his home. He made statuettes from wood; and necklaces and arn-dets from shells, horn, bone, wood or stone. His paintings and engravings of animals and other objects on the walls of caves show great artistic skill, even although they were made up to fifty thousand years ago.

The Developing Mind

As the human mind developed, its powers of perception or range of awareness, and its memory would also increase. The ability to remember things would be of great importance in the development of intelligence in primitive man, as it would enable him to make use of past experiences and to acquire and store up knowledge obtained from others. Such knowledge cannot be inherited from the parents; it has to be acquired by learning during earth-life.

At the same time the power of forethought and planning for the future would be increasing. In this case the provision of food for a season of scarcity, e.g., the winter, might be the main incentive; also, the provision of shelter for a cold or wet season. (Animals show forethought, as in the case of bees storing honey, squirrels storing nuts and dogs burying bones).

Thus man would gradually acquire the ability to plan for the future and to make up his mind or decide on certain courses of action-the first step towards the possession of the power of self-determination and of a sense of free will. Although his conduct would be determined largely by his instincts and the needs of his body, he would also have to think of what was best for the welfare of his family and the rest of the community in which he lived. He would be largely selfish in his actions, but would be swayed to some extent by affection for his family and by a feeling of kinship and even sympathy for the others of his group. He would gradually realise that in such communal life it was wiser to be less self-centred and to pay more heed to the feelings of others, as this made for harmony and happiness. Selfishness could lead only to strife and chaos, just as failure to respect the rights and property of others could only give rise to insecurity with regard to his own. He would also recognise the fact that in thinking of others, he was helping in reality to protect himself and his family, as there was a greater chance of a community surviving where all the individuals were prepared to make sacrifices for the common good.

Further, in the interests of the community certain practices or customs would have to be rigidly observed otherwise evil or hardship might befall its members. Each individual would have to learn that

he alone was responsible for any of his transgressions against these customs, and that he might be punished by the community for such Misdeeds. This would teach him that he could not now follow his natural impulses blindly but would have to exercise some self-control. In this way he would acquire a sense of personal responsibility. With the possession of more self-control, he would be able to choose the right course of action, i.e., the one most beneficial to the group, and reject the wrong or harmful one. Hence he would come to realise that in deciding what was right and what was wrong, he had to think of others in addition to himself. In acquiring in this way a sense of right and wrong, or good and evil, man was developing a conscience. He had taken a definite step in the ascent from the animal creation and was now showing a faint gleam of Divinity.

The Belief in Spirits

Another factor which played an important part in the development of a conscience in man was a belief in spirits and gods. From the earliest times, primitive man in all parts of the world apparently believed that invisible beings or spirits were responsible for all the phenomena of nature: earthquakes, volcanic eruptions, thunderstorms, tornadoes, floods, droughts and forest fires. He also believed that there was a spirit in man and that at death this spirit left the body and existed in a spirit state. This belief in survival was held even by Neanderthal man as shown by the fact that he buried his dead with great reverence and furnished them as for a long journey; and modern man from the Early Stone age has had elaborate burial customs, indicating his belief in survival.

These beliefs about spirits and the life after death would arise to some extent from the fact that certain individuals with clairvoyant or clairaudient powers would be able to “see” or “hear” spirits. The psychic faculty was probably developed at an early stage in the evolution of man as there is evidence of extra-sensory perception even in animals, e.g., the horse and dog. This faculty would be more likely to function freely in these early days as man lived a simpler and more natural life than in modern times. Accounts of psychic experiences occur in the folk-lore and mythology of most of the ancient nations Hebrew, Greek, Persian, Indian and others.

Thus early man had no doubts about the existence of spirits. He also believed that the spirits of the dead could affect for good or ill those left behind on earth. These spirits had to be recognised still as members of the family or community. Naturally, they came to be regarded as gods, especially in the case of those of the chiefs of the community. These spirits or gods were interested in their surviving kinsmen and could be appealed to for advice and help. Man talked to them as if he were in their presence. He told them of his needs and desires, perhaps aloud, but later in thought as he believed that they could read his mind. At the same time they had to be respected and even propitiated in various ways to prevent them from haunting the locality and to avert ills which might befall the family or kinsmen through their displeasure. Tribal practices and customs were therefore drawn up with a view of placating them and of winning their favour and protection.

Practices Arising From Beliefs in Spirits

Arising also from these beliefs, certain races adopted practices to enable them to utilise the spirit powers of a dead person for special purposes. For instance, in building a fort, a human victim might be immured alive in the wall or crushed to death under the foundation stone. It was believed that the spirit of the dead body gave strength and durability to the building, or that the vindictive spirit haunted the place and protected it from enemies. In the same way, a human victim might be sacrificed at each corner of the wall of a city or fortress. (See “The Golden Bough,” by Sir James Frazer.) Even in

modern times certain Pacific islanders place the dead bodies of their kinsmen on high hills or rocks, so that the spirits of the latter can watch over and protect the villages and crops.

Sacrificial practices were also carried out in the growing of food crops. Early man would not realise at first the connection between the seed and the growiniz plant. It is possible that he acquired this knowledge to begin with as a result of leaving cereal grains at burial places as food offerings to the spirits of the dead. He would observe that cereal plants grew from the grains. These cereals would be more luxuriant than those growinLY in the wild state, owing to the soil at the burial place having been dug up and perhaps kept relatively free from other plants. He would, however, attribute the luxuriant growth to the animation or vitalisation of the seed by the spirit of the dead person. From this supposed action of the spirit would develop the idea of a corn-god.

To propitiate the corn-god and so ensure a good crop, it was necessary to offer a human (later an animal) sacrifice. The person thus slain was supposed to represent or to be the incarnation of the corn-god, and his spirit was believed to enter the seed and give life to the growing crop. The blood of the victim was sprinkled on the seed, or his dead body was buried in the field at the time the seed was sown. Thus the spirit was believed to come to life again in the growing crop. This resurrection was celebrated at harvesting by festivals at which the people partook of the first-fruits; later, bread and wine were substituted as symbolising the flesh and blood of the slain god.

These early gods were supposed to be very human in their traits and not greatly superior in their powers to man himself. When they appeared to be unwilling to carry out his wishes. he might bribe or threaten them in variour, ways to force them to do so. Even until recent times certain tribes during solar or lunar eclipses have beaten drums and shouted threats to scare away some malevolent spirit who was believed to be stealing or destroying the sun or moon.

At the same time it has been a common belief in all ages that man himself can exercise powers over nature (supernatural powers) by carrying out practices, which may be described as magical in character. Such a belief forms to some extent the basis of the witchcraft found in savage tribes even at the present time. But witchcraft may also be based on practices whereby the spirits of nature or of dead ancestors are invoked to take action.

Polytheism and Monotheism

In ancient times therefore there were gods of nature, and family and tribal gods, and man fully believed that they could affect for good or ill all that he did, whether in the home or in hunting, tilling the soil or building a house. Hence these gods had to be respected and even propitiated in various ways otherwise evil might befall the family or tribe. In fact, the only way to do certain things was that ordained by tribal custom to appease the gods, and so ensure the welfare of the man himself, his family and the conununity.

From these early crude beliefs in many gods and spirits (animism and polytheism) was to come at a much later stage in man's history, the conception of the One Almighty God who ruled over these minor gods and spirits. This monotheistic conception was vague at first and varied widely with different peoples, but in most cases the God was in human form (anthropomorphism), and was frequently symbolised by the sun, as in Mithraism. He was the Supreme God and was therefore ultimately responsible for all the alarn-iing and mysterious forces of nature and any calamities befawng mankind. Hence if men did wrong, they had to propitiate their God by making sacrifices or by doing penance.

On the other hand, God could protect them from all "ills" if they obeyed His commands and prayed to Him for help.

Early man may not only have speculated as to the nature of God, but also have wondered at the nature and purpose of his own life on earth. He may have yearned dimly for some higher state of existence in which all the hardships of earth-life would disappear. He may have had a hope or belief that at death (a most mysterious change to him) his life would continue in company with his dead ancestors and friends in some such blissful region, ruled by his Supreme God. In these ways would first come the dawn of religion.

Free Will and Determinism

In developing a conscience, early man with his sense of free will would become aware that he could obey or ignore its guidance. He would be still largely swayed in his actions by his instincts and the needs and desires of the body, and seldom would his will power be exercised to control these deterministic factors. Self-control through the action of free will is a character which is not readily acquired. Even at the present time there is considerable difference of opinion as to whether man can successfully resist and overcome deterministic factors by the exercise of his free will-in fact, the problem of free will and determinism has occupied the minds of philosophers and religious scholars since the days of Ancient Greece. This question has been discussed in the S.N.U. pamphlet, "The Nature of Man" and so only a brief mention of it need be made here.

According to the free-will theory, man has complete freedom of choice in making decisions, so that he is responsible for his own actions. Thus he is a being with real moral freedom and a sense of duty and responsibility. On the other hand, the determinists believe that all man's decisions are determined by external or internal factors over which he has no control.

There is no doubt that such factors as environment, education, health, and the laws governing the society in which we live, are bound to influence our minds in making decisions, but the fact remains that we are all quite certain that no matter the circumstances, we have freedom of will, i.e., the power to choose what we think to be the right course. We fully believe that the final decision always rests with ourselves and that we are morally responsible beings.

It is of vital importance to man that he should have free will to choose between right and wrong. If his behaviour was controlled entirely by deterministic factors, he would not be capable of making spiritual progress and could not rise above the animal creation. (It must not be assumed that animals are controlled entirely by deterniinistic factors. Many show an element of free will in the spontaneous nature of their play and in the care and defence of their young.)

The amount of free will, however, possessed by a human being depends upon his spiritual development. A really good man can resist or control deterministic factors. A man of low spirituality may be controlled almost entirely by them. The latter can widen the scope of his free will by being less self-centred and by striving for greater selfcontrol. Otherwise he remains a mere slave to his own passions and selfish desires. God, being free from all inhibitions, is not influenced in any way by deterministic factors; in the Divine Mind free will reaches Completeness and Infallibility of expression.

The Divine plan of our lives appears to have been outlined for us beforehand but we are responsible for filling in the details or completing the pattern. Having free will, we can refuse to do so; we can insist on leading evil, self-centred lives. On the other hand, if we are willing to accept the Divine plan, help, should we desire it, will at all times be given to us from higher spirits.

The Occurrence of Evil and Suffering in the World

In all ages the problem of the occurrence of evil in the world has occupied the minds of philosophers, and the question has been asked, why should an Omnipotent and All-loving God permit evil to exist, especially as it is the cause of much pain and suffering to man and animals.

Theologians in the past have tried to answer this question by claiming that all evil is due to the activities of a malevolent spirit or god (the Devil of the mediaeval Christians, the god Ahriman of the Zoroastrians and the goddess Kali of the Hindus) who preys upon mankind, tempting them to do evil. But it is difficult to understand how an All-just and Loving Father, who has created mankind "in his own image," can also be responsible for creating and setting loose and uncontrolled in the world an arch-fiend with vast powers of causing pain and suffering. Such a doctrine carries little weight with the modern mind and does not promote the cause of any religion, based on a belief in a just God with particular interest in mankind.

There is no doubt that evils do befall mankind and animals, bringing about much suffering. Many of these evils arise from the fact that all living beings have physical bodies and are therefore liable to be affected by the natural forces around them, such as volcanic eruptions, earthquakes, tempests, lightning and fire. They are also liable to suffer if the needs of their physical bodies in regard to food, water and temperature, cannot be satisfied; or as a result of disease.

Suffering is also caused by animals preying on others for food; fighting for food, water or shelter; or attempting to advance their own species at the expense of others. Man himself, of course, has been responsible for much suffering, not only amongst his fellowmen but also in animals.

In many of these cases the factors responsible for the suffering are outwith a person's control. On the other hand, many evils are brought about by the fact that man has free will and is making wrong decisions owing to ignorance, greed, conceit or selfishness. Thus he causes suffering to others, including animals, and to himself.

If God is Omnipotent it was in his power to create a race of perfect beings with no free will, but such creatures would be mere robots, reacting in a perfectly correct and consistent manner to all factors whether inherent in their own nature or present in the world around them. Under such conditions, they could not develop a sense of responsibility and conscience. They would have no knowledge of good and evil, would be unable to appreciate the harmful effects of making wrong decisions and would be incapable of making spiritual progress.

"The Fall of Man"

The doctrine of the Fall of Man from a state of primeval perfection was an attempt to explain the occurrence of evil and suffering in the world. It formed an important dogma in the teaching of the Jewish and Christian Churches. It had also an important bearing on the Christian dogma of the Vicarious Atonement of Christ. However, in the light of modern knowledge, the doctrine of the]Fall is not now generally accepted.

In the first place, it is based on the account in Genesis of the Creation of the first human beings, Adam and Eve, from dust of the earth, and their subsequent fall from a state of innocence as a result of their eating the forbidden fruit of a tree in the Garden of Eden. But the facts of evolution have shown that man was not created directly or in a single step from dust. Instead, he was gradually evolved from the earliest forms of life over a period of some several thousand million years. In the course of this long

period, the highly complex human body was developed, and although certain early types, e.g., Neanderthal man, did not persist, there was no general fall or set-back in his Physical evolution.

The vitalising principle in all forms of life (plant and animal) is spirit, but as nothing is known with regard to its nature, it is not possible to determine whether there has been any form of spiritual evolution corresponding to the physical. It would appear, however, that there are different grades or degrees of spirit development according to whether the spirit is manifesting itself in plant, animal (lower or higher) or man. It may be inferred therefore that the spirits of the early organisms would be, on the whole, of much lower development than those of later organisms of the same kind. This would apply also to the spirits of the earliest humanoid species as compared with those of Neanderthal and modern man. Thus there has been in all probability some form of spiritual development concomitant with physical evolution. In this connection it must be borne in mind that the more the physical body evolves into higher and higher types, the more suitable it becomes as an instrument for spirit.

According to the doctrine of the Fall, the first of mankind were in a condition of primitive innocence. Anthropologists claim that this was not so; early man was in a state of savagery, governed entirely by his bodily desires and his instincts, and thus little higher than the wild animal in his mode of life. In the course of the last twenty or thirty thousand years, he has gradually become more civilised and has advanced to higher ethical standards of living. During this period, set-backs have occurred with different races or nations, but there has been no general fall throughout the world. Instead, there has been on the whole a gradual spiritual advance.

The Discipline of Earth-Life

The spirit on entering earth-life takes on a physical body, so that it can function and have experiences in a material environment along with other incarnate spirits, and thus develop its spiritual nature. At the same time the body restricts the activities of the spirit and isolates it to some extent from other spirits. This apparently enables it to become individualised and develop a distinct and fixed personality, capable of adapting itself to changes in conditions of environment.

The world may be likened to a school in which the human spirit is tested and disciplined to fit it for life in the spirit state. Life on earth is seldom without hardship, pain and suffering. But if these conditions can be met with fortitude, they strengthen the character and have a refining effect on the spiritual nature. In fact, they frequently act as stimuli for fresh efforts. An easy comfortable life without any hardships leads to selfcomplacency, indolence and spiritual and mental stagnation.

The difficulties of earth-life may at times appear to be overwhelming, but they will never seem so great if they can be looked at in proper perspective, i.e., in the light of the spiritual purpose of man's evolution. This purpose appears to have been the production of a type of spiritual being with a knowledge of good and evil, a sense of conscience and the power of free will. Such beings could make mistakes and do evil, but they could also appreciate the harmful effects of wrong-doing and realise the merits of a moral and spiritual life, and could of their own free will try to follow that kind of life to the heights of spiritual greatness. Beings with these qualities could be evolved from the animal creation only after ages of pain and suffering, of sifting and sorting, but they would be closely akin to the Divine.

The Pressing Need for Spiritual Progress in the World

Man's spiritual progress throughout the ages has been slow. He is still content to lead a life of no high ethical and moral standard. His material achievements in science and industry have far outstripped his

spiritual development and as a result there is a danger that new discoveries and inventions, for instance, in nuclear physics, may be used for wrong purposes-for warfare instead of for the welfare and advancement of the human race. Sir Winston S. Churchill, in referring to the new discoveries of atomic energy, said some years ago, "Under the impact of war, man became aware of the vast powers of atomic energy, a discovery for which he was not spiritually fitted. Man's inventiveness had outstripped his spiritual progress. We and all nations stand at this hour of human history before the portals of supreme catastrophe or of measureless reward. My faith is that in God's mercy we shall choose aright."

It would appear that with advance in knowledge, the need for spiritual progress becomes more pressing, to ensure that the knowledge will be put to the right use. Spiritual progress has undoubtedly been made. In the world to-day there is with many nations a higher ethical and moral standard, less cruelty, more respect for the rights, beliefs and welfare of others, and more charity. There is also a greater appreciation of the eternal values of life, namely Goodness, Truth, Justice and Beauty, and a more widespread sense of a Supreme Power or InteWgence behind the Universe. But in spite of this spiritual advance with its strengthening of the forces of good, there have been disastrous setbacks due to outbursts of evil, as shown by the extreme cruelty and ruthlessness only too often manifested in the modern world, e.g., in the Great Wars. It would appear that with advance of civilisation, man not only becomes more sensitive to higher spirit forces, but also, if he ignores these forces, he renders himself more susceptible to lower or evil influences.

For real spiritual advancement to be made throughout the world, men must not only make progress themselves, but they must also help others to do so by promoting a universal spirit of Brotherhood, justice, Peace and Goodwill, together with a reverence for all life. What with the ease and rapidity of modern travel and communication, nations at one time regarded as being far apart are now in close contact. The world has become like a single neighbourhood, and men of all nations must learn to live together as good neighbours, instead of yielding to the forces of evil and dissipating their energies and resources in unrest, slaughter and bloodshed.

By living in attunement with God and thus by cooperating in the Divine Scheme, man can move forward, although perhaps slowly, to heights of spiritual greatness. Already he can catch glimpses of these heights in moments of exalted inspiration. At these times he can dimly sense the Divine Presence in all its qualities of Timelessness, Goodness, Truth, Justice and Beauty. With further spiritual progress, the powers of apprehension of these Divine qualities will increase until the human spirit will be able to realise them in all their fullness. Then man will also be aware that he is in truth a Son of God.

The Nature Of God

The universe is of such utter vastness with its millions and millions of galaxies, suns and planets, that it is quite impossible for man to have even the slightest conception of the Infinite and Almighty Power responsible for its creation and sustenance. However, throughout all things, animate and inanimate, there is evidence of purpose, planning and guidance. It can therefore be postulated that there is a Universal Mind or Principle, which has not only infinite creative powers but is also All-loving, Omniscient and Omnipotent. This Mind has a vitalising and sustaining power on all forms of life, including mankind.

The Eastern stics have re ded this Divine Mind as purely impersonal in nature, although having a benevolent influence on man. Aristotle also believed that this Universal Mind was impersonal in nature

but he thought that It was transcendent and quite aloof from the world and not actively interested in mankind.

On the other hand, with many nations, the early anthropomorphic ideas of God have persisted throughout the ages; they still believe in the personal nature of the Divine Mind or God. He was the Zeus of the Ancient Greeks,theMithraof the Persians and Romans, and is still the fahveh of the Jews, the Heavenly Father of the Christians and the Allah of the Mohammedans. And this Divine Mind, no matter the name applied: God, fahveh, Allah, Brahman or Heavenly Father, is accessible to all mankind, whatever their race, colour or religion. As the Hindu God, Krishna, in the Bhagavad-Gita says, " By whatsoever path you come to Me, I shall welcome you, for the paths men take from every side are Mine."

"One Life through all the immense creation runs,
One Spirit is the moon's, the sea's, the sun's;
All forms in the air that fly, on the earth that creep,
And the unknown nameless monsters of the deep-
Each breathing thing obeys one Mind's control,
And in all substance is a single Soul."

Aeneid, VI. Virgil.
(F.W.H. MYERS)