

IN SUPPORT OF A SUSTAINABLE GREEN EARTH

A Paradigm Shift from *Homo Faber* towards *Homo Custos*

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1. Introduction

The development of culture associated with humanity was inextricably intertwined with the developments of gadgets. The nomadic hunters developed sharp tools in their prehistoric search for food and when settled millennia later as agricultures designed and decorated pots, houses, streets and numerous gadgets in an attempt to control the environment and to make life easier. However, greed did not overtake humanity's aspirations till the industrial revolution in the eighteenth century. Till that time, there was a balance between the technological development and the environmental sustainability. However from the industrial revolution onwards, mass production or fabrication started to pollute the earth. The industrial waste whether it is the water coming out of the factories or the gaseous elements spit from its chimneys or the exhaust from the vehicles or the advanced waste from the nuclear reactors started to contaminate and pollute the earth and even the outer space. The paradigm that determined and governed humanity was that the earth was given totally to the humanity and we could utilize it in any way which led to the exploitation and the ultimate disaster with the environment. To a certain extent the environmental catastrophe is due to the character of humanity as a *faber* and it has to be corrected. The dominating, manipulating and engineering perspective is to be replaced with the perspective of a steward; the perspective of *homo faber* is to be replaced with the mindfulness of *homo custos*; only then the sustainable progress of humanity is possible. Otherwise pollutions will collapse the environment which will catapult inevitably the end of humanity. Therefore the paradigm shift from *homo faber* towards *homo custos* is inevitable.

Reductionism was a method devised by humanity in order to comprehend and describe the plurality of things and the manifoldness of its

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expressions. Both in the East and the West, thinkers proposed certain building blocks like fire, air, water, earth and space as the constituents of this myriad manifoldness and thus derived rational explanatory principles. The atomists brought forth the explanatory theory of atoms to answer the multiplicity they experienced in this universe. Thus, Democritus in the ancient Greece and Kanada in the ancient India proposed the atomic theory of indivisible atoms moving in the empty space colliding and structuring sustainable forms. *Purusha* with its permanence and *Prakriti* with its contingency the *Samkhya* philosophical system in ancient India and Heraclitus and Parmenides of ancient Greece emphasized the dual aspects of change and permanence as the ultimate metaphysical principles of this universe. The abstract *apeiron* of Anaximander of ancient Greece paved a mathematical and abstract method of explaining the plurality experienced in this universe. In the Western tradition, Socrates gave a humanistic twist to this materialistic natural description of the universe by introducing knowledge and ethics and the importance of human life while in the Eastern tradition, Buddha, Mahavira and other sages negated the materiality and upheld the spiritual transformation of the human person as the ultimate aim and purpose of life. In the West, Plato took the abstract, mathematical interpretation of the universe of his predecessors and refined it into the theory of the World of Ideas that is eternal and perfect while the terrestrial life as a shadow of the life in the World of Ideas where everything united with the One, the Good and the Beautiful, which in Indian categories as *Sathyam*, *Sivam*, *Sundaram*. However, his disciple, Aristotle blended the three different streams of thought, namely the abstract – mathematical, the imaginative – tangible and metaphysical into a single whole, providing a holistic vision. Thus a fusion of physics and metaphysics is visible in his interpretation of the universe which became the foundation and bulwark of the western theology, philosophy and science.

2. Aristotelian Organism

Unlike Plato, Aristotle accepted the dual aspects of permanence and the flux of the reality as a fact even in this universe and in this life itself.¹ He did not consider and explain the reality as existing somewhere outside the earth as pertinently described by Rafael's immortal painting where the two masters are debating with the raised forefinger of Plato pointing towards the heavens

¹A detailed analysis of the Aristotelian organism is given in Mathew Chandrankunnel, *Ascent to Truth: The Physics, Philosophy and Religion of Galileo Galilei*, Thiruvananthapuram: ICCRI, 2011, 8-10.

showing the reality is out there while Aristotle asserting by his palm that the reality is here, down to earth, and now. Aristotle compiled, fused and integrated all the knowledge of his times into a whole. Thus the Heraclitan flux, the Parmenidean permanence, the Anaximanderian abstraction, the naturalists, five elements and the structural forces and the Eudoxian circles, the common experience of the motion of the sun and the day and night along with the fall of objects were unified into a system of thought known as Aristotelian physics. Thus the earth became the centre of the universe and sun, moon and other known heavenly objects rotating around it in concentric circles depicted as geocentric universe. Thus the universe was divided into terrestrial and celestial having different physical rules as well as constituent elements. The fire, air, water and earth were the constituent elements with the structural forces of the polar opposites, namely the wet and dry and the hot and the cold binding the things in the universe below the moon known as terrestrial bodies. The motion of the bodies is based upon its constituent elements. The fire and air have a tendency to go up while the earth and the water have a tendency to go down. If the fire and air elements are more, then the object has a tendency to go up. If a heavy and a light material are dropped simultaneously from the same height, the heavy one will hit the ground first. All the objects in the terrestrial universe have a tendency to come to rest. The celestial world that is above the moon is constituted of ether, a perfect element and hence the heavenly bodies move eternally in circles and they could never undergo change. Thus, Aristotle reconciled the Platonic abstraction of the perfect world of ideas and the naturalistic empiricism of the Pre-Socratic philosophers through his division of the universe into the terrestrial and the celestial and designating different physical laws operating in these diverse levels.

Continuing his explanation of permanence and change in this universe, Aristotle developed four metaphysical principles, essence-existence, form-matter, substance-accidence and act-potency, in order to explain the permanent and changeable features of the universe. Aristotle accepted the reality of these two features and incorporated into the system of thought in explaining the phenomena of the world. The permanent features are designated by the essence, form, substance and the dimension of time is introduced through the concept of act and potency. The future development of a system is envisaged through the potency and the actuality is defined as its present state. In explaining the polar opposite features of the universe, namely, change and permanence, Aristotle introduced the four causes, namely material, efficient, formal and final

causes. Taking the example of a marble block, the material cause is the marble, the efficient cause is the instruments that are changing the material into a statue according to a plan or the model of the statue, the formal cause. The real instrument of this transformation is the sculptor who is undertaking the construction of the statue. For Aristotle, the most important cause is the final cause that is providing the purpose of the whole process. The fame or the money received by the sculptor for making the statue will be the final cause in this example. Thus, the purpose defines and guides the whole process and gives a meaning to it. Every process in this universe has a purpose and even every human action has a purpose. This concept of purpose gives the holistic outlook to the Aristotelian vision. The organic whole controlling and guiding the parts is very much the foundation of the Aristotelian physics and metaphysics. The whole is more than the parts and a mere collection of the parts will not make the whole.

Aristotle observed that his physics was unable to describe the totality of the universe and thus introduced the meta-physics. From the geocentric cosmology of a centre that is static and giving impetus to the motion of the planets, Aristotle proposed a mover that is static and stable yet imparting motion to everything else. Thus, he introduced a metaphysical uncaused cause to complete the system of thought observing that such an explanation is necessary for completion. Aristotle found the insufficiency of physics in giving a complete description of the universe and took refuge in going beyond it, anchoring his thoughts in meta-physics and proposing the uncaused cause.

3. The Power of Human Reason to Discover Patterns in Nature

In the development of Western thought, the next stage came in the middle ages through the profound fusion of faith and religion. The Jewish religion and Christianity penetrated the Greek philosophy and Roman culture during the middle ages. The Jewish concept of God, Yahweh and the Jesus Event together form the core of Christianity. Yahweh made a covenant with Abraham and later the Abrahamic covenant was reinforced through the covenant made with Moses and Israel and through various Kings, Judges and Prophets of Israel. The arrival of the Messiah was part of the covenant and when at last he had come, the Israelites did not recognize and accept him. They rejected and crucified him because their expectations were different. They were awaiting the arrival of a political Messiah, the anointed King for a millennium and could not accept Jesus who had come with a spiritual transformation. Through the incarnation, life, crucifixion,

death and resurrection of Jesus, Christians believe that the advent of the reign of God is realised in history. In the middle ages, this Christian salvific mystery was fused with the Roman culture and Greek philosophy paving its way for the European or Western culture.

St. Augustine used the Platonic philosophy to interpret the Christian faith rationally while St. Thomas Aquinas used the Aristotelian philosophy. St. Thomas Aquinas identified the uncaused cause and the unmoved mover of Aristotelian metaphysics with God and rationally interpreted the Christian faith.² Thus through Scholasticism, Aristotle gave the rational foundation to the Western Culture which is predominantly Christian. Aristotle and St. Thomas gave the best model for theologizing, that is developing physics and transforming it into metaphysics and utilizing that metaphysics to interpret the encounter between the divine and the human. Aquinas proposed that the human intelligence can penetrate the nature, discover the regularities, patterns and order in this universe which the human reason could interpret in terms of physical laws. Due to the introduction of Aristotelian thought and Scholasticism, nature was seen as created by God and is intelligible to human person who in turn was created in His image. Thus nature was interpreted with an inherent order and regularity while the human reason was endowed with the power to penetrate and understand it. The assertion of the existence of the material reality with an inherent order capable of interpreting it in regular patterns was a great contribution in the intellectual growth of humanity. Thus the Aristotelian-Thomistic synthesis paved the foundation for the ascendancy of science.

Due to the over influence of Scholasticism and forgetting the warning of St. Thomas, in the medieval period the Aristotelian geocentric cosmology and metaphysics was identified with faith and any challenge would be considered as a heresy and schism which would be a heavily punishable because of Christianity's alignment with power. Thus, the identification of the Christian doctrine with Aristotelian metaphysics became one of the characteristic features of the Middle Ages. Compared to other cultures that denied the existence of matter, this basic presupposition of the existence of matter made the big difference in the development of science in the West. However, the Church resisted any deviations from the Aristotelian-Thomistic system of thought blindly believing that it formed the foundation of Christianity and paved the way for the later confrontation with science.

²Chandrakunnel, *Ascent to Truth*, 38-53.

4. The Ascendency of Cartesian Atomism

During the beginning of modernity, scholasticism was attacked by the visionaries. The whole agenda of scholasticism was reduced to reflections and debates on God, salvation and sin, absolutely forgetting the nature and human life here on earth by mediocre elements interpreting commentaries on commentaries on Aristotle. The visionaries criticised the methodology, object of thought and proposed that there should be an emphasis on the study of nature and a new language should be developed in describing the world. They called for experimental evidence as the true methodology of acquiring and processing knowledge based on induction rather than the self-evident axiomatic deductive methodology of Aristotle. They proved how Aristotle was wrong because he was in a hurry to conclude without basic investigations. They argued that mathematics as the new language of science and nature the object of its thought so that the dynamics of nature could be understood and thus humanity could control and manipulate nature facilitating human life.

Copernicus inaugurated the attack on the Aristotelian system by his revolutionary hypothesis on the heliocentric cosmology which gradually replaced the Aristotelian geocentric cosmology. Galileo, Leonardo Da Vinci, Cardinal Nicholas of Cusa, Descartes, Francis Bacon, Thomas Hobbes were some of those intellectuals who proposed for a shift of emphasis from God to nature.³ Bacon criticised the tribal social culture as a stumbling block for human progress and advocated for the elimination of these faulty individual and social habits. Thus the idols of the tribe, cave, market place and theatre were criticised and caused a social restructuring that paved the way for the renewal of the society. Because of this theoretical input and the continuous emphasis on the elimination of the tribal outlook transformed the highly tribalised European society and paved for a universal outlook based on humanism and its rapid growth. This critical reflection on the society and its transformation should be an ideal for the caste divided Indian society where a critical approach to the stumbling blocks of human progress has never been made. This renaissance spirit separated theological reflections on God, soul and salvation from philosophical investigations on the nature. In modernity the rise of reason is visible and its ultimate ramification and refinement as scientific rationality is known as renaissance.

³Marie Boas Hall, *The Scientific Renaissance 1450-1630*, New York: Dover Publications, 1994. David C. Lindberg, *The Beginnings of Western Science*, Chicago: The University of Chicago Press, 1992.

Cartesian doubt and search for the clear and distinct ideas proposed atomism as a methodology for the investigation of nature became an alternative to the scholasticism and became the dominant paradigm of science once again alienating the holistic outlook proposed by Aristotle and paved the way for a mechanistic interpretation of nature. He divided even human person as body and mind, the extended being and thinking being and called for an infinite division of material reality which paved rich dividends in humanity’s search for its understanding and controlling of nature. The rapid growth of science and the rich facilities we are enjoying due to technology are because of this philosophical vision and shift of emphasis that caused a social upheaval. Most of these intellectuals who steered the modernity were strong believers and it is their faith that catapulted them to study nature as the handmaid of God and to discover His splendour and Majesty in nature.

5. Dominance and Exploitation

Framing on the Cartesian dualism based on the atomistic perspective and the mathematical description of nature, Galileo, Kepler, Newton, La Place and other such intellectual giants extended the philosophical vision on nature into scientific practice and discovered the dynamics of nature and engineered gadgets facilitating life in an unforeseen way.⁴ The Newtonian physical laws and the law of gravity paved the way for a mechanical interpretation of the world rejecting the Aristotelian holistic outlook. The intellectual engine for the penetration of the dynamics of nature and the description of it in terms of physical laws were the Cartesian doubt and the mechanistic paradigm, could explain many of the phenomena in this universe creating a euphoria expressed by Lord Kelvin that there were no mysteries in this universe and only two mere clouds which could also be eliminated by extending the Newtonian laws. Thus, science as tool in unravelling the mysteries of nature and technology as a means in transforming this knowledge into gadgets changed the phase of the earth and the life of humanity in myriads ways. Humanity had an inflated ego about its own unlimited power and capability.

The scientific foundations given by Newton in describing the world were later refined by James Clark Maxwell by introducing the electrodynamics equations and the concept of electrical and magnetic fields which were experimentally discovered by Michael Faraday leading again into a relativistic and quantum mechanical revolution. The confusion

⁴Roger Penrose, *The Road to Reality*, London: Alfred A. Knopf, 2004.

in the field description of Maxwell and the absolute space and time description of Newton was intuitively investigated by Einstein who developed the special theory of relativity in 1905. However, it was Poincaré who suggested that a space and time description of the universe has to be fused into spacetime and Minkowski incorporated the Riemann curved space into relativity enabling Einstein to generalise the theory of relativity. Thus the matter, space-time continuum became the new paradigm in describing the universe as a holistic cosmic singularity.

The conceptual drizzling in the area of thermodynamics became a hurricane and shattered the dear concepts then reigning in physics. The quantum concept introduced by Max Planck in Berlin exposed a discontinuous, indeterministic, probabilistic and uncertain nature. In grappling with the problem of Black Body Radiation Max Planck never intended that his study would revolutionize human perception about the universe.⁵ A group of intellectuals under the capable guidance of Niels Bohr, Werner Heisenberg, Wolfgang Pauli, Erwin Schrödinger, Victor De Broglie, Max Born, John von Neumann and others developed and extended quantum mechanics interpreting nature as indeterministic and quantum mechanics as a complete theory. The development of the theory of relativity and quantum mechanics helped the scientists to draw the full physical history of the cosmos in its microscopic and macroscopic structure, from its very tiny atomic size towards its big bang explosion and expansion thereafter.

6. Macroscopic History of the Physical Universe

Lemaître was one of the pioneers who applied Albert Einstein's theory of General Relativity to cosmology and proposed that the cosmos was confined to a tiny atom and an explosion expanded this universe when the space and time began.⁶ He was from Belgium, studied at the Universities of Leuven, Cambridge under the famous astronomer Eddington, and took doctorate from the Massachusetts Institute of Technology, United States. In a 1927 article that preceded Edwin Hubble's article by two years, Lemaître derived what came to be known as Hubble's law and proposed it as a generic phenomenon in relativistic cosmology.

Lemaître observed certain side effects for the De Sitter model which in the hindsight were very clear indication that any truly useful model of the cosmos in General Relativity had to be dynamic and static. Lemaître

⁵Mathew Chandrankunnel, *Quantum Holism to Cosmic Holism: The Philosophy of Quantum Mechanics*, New Delhi: Global Vision Publishers, 2008.

⁶Chandrankunnel, *Ascent to Truth*, 428-434.

was wise enough to observe a certain phenomenon in the De Sitter model which the proponent himself was unaware of. De Sitter’s solution showed that any particle introduced into his empty static Universe would appear to recede from any other particle and show some red-shift. This concept of red-shift later became widely accepted with Lemaître’s theories and Hubble’s observations. Lemaître also noticed that De Sitter made a mistake by picking up a ‘preferred frame of reference’ for his argument. Where both Einstein and De Sitter actually assumed a homogenous and isotropic Universe, the latter made the mistake of assuming a lack of homogeneity in the space. This made him draw wrong conclusions according to Lemaître. Lemaître on the other hand showed how we can preserve this homogeneity and isotropy by changing the coordinates.

Another significant contribution of Lemaître is his viewpoint that the scale factor, or radius of the Universe need not be constant, as was the case in both Einstein’s and De Sitter’s original models. It was a momentous and crucial discovery as far as the concept of an expanding Universe was concerned. Radius and time are interrelated. So by keeping that the radius factor irregular, Lemaître showed mathematically that radius is a time-increasing function and that the distance between all points in the space is constantly increasing. Lemaître also showed that if Einstein kept his Universe homogenous, it would no longer remain spherical instead an ever extending space. Thus the stable Universe of Einstein was written off for good. However, Lemaître chose to depict the De Sitter model as an incomplete replica of an expanding Universe which could predict even the concept of red-shift, without the proponent himself knowing about it.

In the 1925 paper, Lemaître also gave indication for a law which would be later called Hubble’s Law. Lemaître’s model involved an evolving Universe, with red-shifted nebulae illustrating space-time expansion and expanding with nebulae receding at radial velocities directly proportional to their distances. This law which later came to be called Hubble’s Law can be mathematically represented, when v is the radial velocity, D is the distance and H is the Hubble Constant, as $v = HD$.

Between 1925 and 1927 Lemaître worked on a paper which contained the details of a complete solution to Einstein’s equations that would fully model an expanding Universe. The paper was published in 1927 and with a lengthy title “A Homogenous Universe of Constant Mass and Increasing Radius Accounting for the Radial Velocity of Extra-Galactic Nebulae.” His theory was firmly rooted on the previous two models but he accommodated into his equations data from the existing

astronomical observations of red-shifted nebulae in order to establish the fact that the Universe has been expanding.

Using Hubble's estimates of time and with the help of Einstein and De Sitter models he even obtained a radius for his own model of the Universe at: $R_E = 8.5 \times 10^{28}$ cm which equals 2.7×10^{10} parsecs. His theory of the primeval atom from which the cosmos originated came only as his next interest. When Lemaître completed his next paper again in 1927, which contained the notion of the primeval atom, he chose to publish it in an obscure Belgian journal not wanting to draw the attention of all; for he was sure that it was quite provocative and speculative. This paper remained rather unnoticed until Hubble published his findings in 1929. Though Lemaître handed over a copy of the paper to his former mentor Arthur Eddington he misplaced it somewhere. When in 1929 Hubble came up with his observations, Lemaître reminded Eddington that he had already submitted the solutions to him, which he had not considered seriously. Eddington having realised his mistake took the first step to translate and publish Lemaître's work in 1930 and propagated it.

By extrapolating backward in time, Lemaître envisioned all the heavenly bodies squeezed into a super compact primordial matter which he called the 'primeval atom'. Then all at once there was this moment of creation and the single atom suddenly decayed generating all the matter in the Universe. Here Lemaître made the speculation that the cosmic rays observable today might be the remnants of this initial decay.

The theoretical musings of Lemaître and Friedmann were brought to the forefront by the investigations of Edwin Powel Hubble (1887-1953), an American Astronomer who established on his observational evidences that the galaxies are not at rest in space. Hubble is noted for having developed the theory of Big Bang to its full structure, the discovery of the Andromeda galaxy, the Hubble Constant and Hubble's Law and for his numerous other observations from his famous Mount Wilson Observatory.

Hubble and his assistant Humason noted the red-shift of a number of galaxies and found that farther the distance of the galaxy, greater is the red-shift. This showed that farthest galaxies are moving at a greater speed than the closer ones. They concluded that due to the expansion of the Universe stretching happens to the light waves from a distant galaxy. The galaxy is not receding through the space, but the expansion of the space itself causes the red-shift. Thus red-shift and the receding galaxies provided the proof for the expansion of the Universe. He published these results in the 1929 paper titled "A Relation between Distance and Radial

Velocity among Extra-Galactic Nebulae.” He put the mean velocity of recession at 500 km/sec. He also determined the rate of expansion of the Universe as 525 km/sec per mega parsec. Assuming this rate to be constant we could apply it to the most distant nebulae and calculate backward to determine the point from which the galaxies emerged. This time which would help us to calculate the time in which the Universe began was called the Planck’s Time, 10^{-43} seconds.

Hubble measured the red-shift of almost forty six galaxies and plotted a graph of Velocity of recession versus the Distance of galaxy and obtained a roughly linear graph. Hubble thus proposed that the galaxies were not dashing through the cosmos, but their speeds were mathematically related to their distances. This mathematical relation was of deeper significance because it made all the more obvious that at some point in history all the galaxies in the Universe compacted into a small region. Perhaps this was the first observational evidence for a moment of creation or what we call the Big Bang. So everything in the Universe apparently emerged from a single dense region during the moment of creation. So if we travel backward in time, yesterday our neighbouring galaxies were closer to us. A month back they were closer still. And thus in some point of history, as Lemaître predicted, there will be the presence of a highly condensed primeval atom from which the entire cosmos emerged with a Big Bang. The age of the Universe is calculated to be about 13 billion years.

Before, Lemaître and Hubble, the steady state universe proposed by Fred Hoyle was prominent. However, the theoretical and experimental research of Lemaître and Hubble changed the static universe into an expanding and dynamic universe. The explosion of the primeval atom proposal of Lemaître was ridiculed by the steady state theorists as big bang. Gradually the name stuck to the primeval atom theory. In addition to Lemaître and Hubble, George Gamow gave some further theoretical refining to the Big Bang cosmology. Arno Penzias and Robert Wilson made an accidental discovery of Cosmic Microwave Background Radiation in 1964 proving the Big Bang cosmology and received Nobel Prize for this discovery. The Big Bang cosmology thus, explains the origin, evolution and the future of our immense cosmos. Today cosmology with the aid of quantum mechanics and the theory of relativity, accurately pinpoints that the universe began 13.7 billion years ago from a quantum holism with a big bang ever after expanding and evolving in its own myriads ways into a cosmic holism.

7. Macroscopic History of Life

The developments in the physical sciences enabled an explosion in the biological sciences, catapulting humanity to discover the ingredients of life and the dynamics of complexity and to control and engineer it as it wanted.⁷ As a symbol of this recently acquired power, while officially announcing the completion of the Human Genome project on 26 June 2000 at White House, Bill Clinton observed that “today, we are learning the language in which God created life.” John Sulston, director of Sanger Centre in England, states that “we have got to the point in human history where for the first time we are going to hold on our hands the set of instructions to make a human being. That is an incredible philosophical step forward, and will change, I think, the way we think of ourselves.”⁸ Through this research, human rationality is penetrating the thoughts of God as Einstein has once dreamt of. This project comes as a climax to the human search for unravelling the ingrained secrets of life itself; it is an attempt of cataloguing of human genes and discovering the molecular nature of cancer, diseases like Alzheimer and Huntington. As Pope John Paul II envisioned that “through the knowledge of genetics and molecular biology, scientists can look with the penetrating gaze of science into the inner fabric of life and the mechanisms that characterize individuals, thus ensuring the continuity of living species.”⁹ This informative power and epistemological advancement can easily be converted into technological power; both constructively and destructively. Thus, genetics enables the human genius to reconstruct dead animals of a bygone era and sustain the diversity of life by cloning a number of endangered species. This new technology can also be a curse due to the development of new forms of germ warfare proficient in contaminating and destroying the entire humanity itself. Thus, genetic engineering is a treasure trove of philosophical implications with an unending assault on ignorance; but bringing home unanticipated social effects such as discrimination, stigmatisation, etc. Genetic screening before insurance policies, permanent appointment for jobs, starting emotional relationships, membership in clubs, etc., are possible scenarios due to the availability of genetic information.

⁷Carl Sagan, *The Dragons of Eden*, New York: Ballantine Books, 1977.

⁸*Indian Express*, 27 June, 2000.

⁹Juan de Dios Vial Correa and Elio Sgreccia, *Human Genome, Human Person and the Society of the Future*, Proceedings of the Fourth Assembly of the Pontifical Academy of Life, Vatican: Liberia Editrice Vaticana, 1999, 7.

Genetic technology has also tremendous religious significance because the origin and dynamics of life – creation – has been cracked by human reason and unless care is taken in the handling and manipulating of this knowledge ‘death’ can prevail upon humanity instead of the promised ‘immortality’ as the metaphor from the Book of Genesis reveals. The prenatal diagnosis and stem cell research can enhance the culture of death prevailing at present in our society by selectively culling the defective unborn child. Manipulation of genes, cutting and pasting genes from one organism to another can dehumanise the human person because there is this dormant belief that human person is nothing other than his or her genome. A new concept of personality is derived from this genome research. Genome, either of a plant or of an animal, including that of the rational animal is the fundamental matrix of human ontic development and of its functionality.

Genetic research and engineering has to be examined in its twofold processes; as an object of scientific pursuit and as an object of ethical judgement that enable in creating a philosophy of life for the contemporary technological society. *Techne* without *Poesis* is destructive; technology without the aid of wisdom cannot be constructively administered. As a background to this moral and ethical analysis, let us examine this epochal intellectual discovery that asserts once again the evolutionary molecular origin of human life from the unicellular organism or the nature of biological continuum and its revolutionary social and religious impacts on the human society in general.¹⁰

Today human reproduction is genetically manipulated. Fertilisation can take place by just knocking off the nucleus of the ovum and replacing it with the nucleus of another cell, even from the same animal. Artificially cultured and then implanted in the womb, a clone will have the characteristic features of the original cell. This methodology when perfected can be applied in artificially cloning a person. The technology is available and there are many technically equipped scientists vowed to make clones.

Cells are the basic units of life in our human body. There are one hundred million cells existing in human body, roughly around in 200 different forms by 47 doublings of a sperm and ovum fused to a single cell. The cell is divided into the nucleus and the cytoplasm. In the cells we find DNA, genes and chromosomes which are the vital powers of life. DNA has three fundamental constituents: a phosphate molecule, a sugar molecule, and a base molecule. The three components are linked together by chemical

¹⁰Charles Darwin, *Origin of Species*, London: Wilside Press, 2003.

bonds in the order of phosphate-sugar base, and this combined unit is called a nucleotide. The four bases occurring in DNA are identified as Adenine(A), Guanine(G), Cytosine(C), and Thymine(T). These are the fundamental biological units of life. These four bases are like the letters of a language.

Genes are responsible for the individuality of the person, colour, texture, size, etc. The Human Genome Project estimates that there are roughly 30,000 genes in a human person. Chromosomes are thread like structures carrying genes. A human cell has 23 pairs of chromosomes. When a new offspring is produced, the male and female parents contribute the same number of chromosomes, and there are a fixed number of them in each cell. A DNA strand is made up of a large number of nucleotides stitched together like beads in a necklace. The DNA constitutes the amino acids whose long chains are called proteins. In a DNA there are 3.1 billion varying combinations of the four bases. The sequencing is not arbitrary or random. Each combination contains vital information in the production of proteins. According to this complex manual of genes human biological life is governed from conception to death. The complete mapping of the 3.1 billion sequences of the bases is known as the Human Genome project, a collaborative project of the National Human research institute, Bethesda, Maryland, USA and the Craig Centre of Celera Genomics of Rockville, Maryland, USA. Though the project is said to be completed, only the sequence of ordering of the basic four bases of the DNA have been mapped. The difference between one individual and another is very narrow. Only 3 million proteins out of 3.1 billion make the difference. Two individuals differ on the average only in one nucleotide per one thousand. Moreover, we share almost 70% similarity of DNA with fruit flies and much more with our mammalian brothers and sisters; 30% with yeast, 75% with mouse and 90% with cow and, 98.4% with chimpanzees. Thus humans are part of the biological continuum of God's creation. The history of life, from its very beginning, started as a unicellular organism and evolved into complex forms and ultimately as human beings shares the same chemical structure and texture which enabled humanity to transfer genes from plants to animals and to humans and vice versa once again demarcating that all life is a continuum and a whole just like the physical continuum.

The next stage of development is in filling the gaps among these continuums, namely, the gap among matter, life and mind with the tools of science and technology. This would be the ultimate project of humanity which would be considered as its vocation as knower and fabricator but knowing that it has already led to a crisis.

8. *Homo Faber* Constructs a Crisis

Newtonian determinism and its ascendancy caused fragmentation and alienation by its mechanistic vision devoid of the organic purposefulness of the Aristotelian-Thomistic philosophical perspective. Dominance and exploitation became the hall mark of the said science. Knowing the present state of a system and the governing laws scientists thought that they could absolutely predict and determine the future of a system and the world at large. The overall outlook was thus a determinism and atomism leading to a philosophy of using, abusing, misusing and overusing the nature and leading to the present ecological catastrophe and resource crunch leading to again an investigation into the foundations of Western culture and science. As this scientific rationality was making quantum leaps, the nature and human life suffered setbacks. Scientism overpowered human life and philosophers like Nietzsche, Husserl and Heidegger, criticised the march of science and started questioning the rational foundations and the ability of science in guiding life and describing the universe. Nietzsche inaugurated the onslaught on the basic foundations of the western culture by proclaiming the death of God. When Nietzsche cried aloud the death of God he intended that the inherited notions of God and the world view were not life promising and hence to be replaced by a vision based on the will to power. Nietzsche was not criticising the Christian religion alone but even more savagely the foundations of western science. He observed that science had done what the religion had done in a much worse way. When religion said that God is eternal, science replaced it with the slogan that matter is eternal and thus both religion and science gave an impoverished image of humanity. Nietzsche charged that both science and religion utterly failed to recognize the power inherent in the human beings and called for a radical renewal and rediscovery of human nature. He was introducing a Socratic criticism to the whole endeavour of knowledge. Religion and science according to him, instead of anchoring human beings at the centre of the world misplaced him with God and matter erroneously and had done irreparable damage to the human destiny as chaotic and indeterministic. Thus the rational foundations based on the thoughts of Descartes and Kant were out rightly rejected by Nietzsche and this clarion call was taken up by Husserl and Heidegger.

“The crisis of European Sciences and Transcendental Phenomenology” was the last great work published by Husserl where he delved deep into the general lament about the crisis in European culture and discovered that the root cause of the crisis and attempted to give a solid

foundation beyond doubts that might become the corner stone for all disciplines which he called phenomenology. He set out to arrive at the essence of things at the realm of pure consciousness through a series of reductions, namely phenomenological, eidetic and transcendental reductions. Heidegger turned the Husserlian bracketing methodology from the content of investigation into the how of investigation and arriving at the thing in itself or the disclosure of the being. The glorification of the reason inaugurated by the modern philosophers reaching to its zenith as scientific rationality is thus thrown away to the dust bin of history by Heidegger. He accused science of squeezing the essential characters of humanness and turning it into a need based product that could be fabricated.

9. *Homo Custos*

These onslaughts against reason, against method and on the atomistic, sceptical foundations of Western culture and its offshoot science, exposing its vulnerabilities opened up the floodgates of counter cultures known differently as hippy, new age movements doubting everything and living in the randomness of the momentary and search for holistic alternatives proposing human being as the custodian, steward of the universe rather than the dominant exploiter.¹¹ At this historic crisis moment comes the thinkers like physicist turned philosopher David Bohm, the palaeontologist philosopher turned theologian Teilhard de Chardin, and the revolutionary activist turned spiritualist Aurobindo, with their holistic vision of reality to save the crisis ridden humanity. They propose that humanity is inextricably intertwined with the cosmos and could not separate itself from the cosmos. Human beings are to function as guardians of the cosmos to sustain the earth and replace the dominant exploitative paradigm with a holistic vision of reality. These visionaries derived their solutions from their own respective fields such as quantum mechanics, evolutionary theory and Indian philosophy and applied their new creative insights systematically to the totality of reality in its cosmic dimensions as antidotes. The Aristotelian causal system is reduced into an instrumentalist dynamics by the development of science, paving the way for secularism, objectification, fragmentation and pragmatism rejecting the spiritual, the divine and the truth which was inextricably intertwined with the life of humankind. It is to be said that the visionary leaders based their thoughts on spiritual experiences and developed a vision of life taking into account the spiritual dimension of humanity. However, gradually due to the onslaught of the atomistic science and its discoveries the spiritual dimension

¹¹Fritjof Capra, *The Turning Point*, New York: Simon and Schuster, 1988.

was totally denied and hence the transcendental dimension of humanity is eliminated degrading it in to the level of matter. In this atmosphere, the spiritual, philosophical visionaries came up with the new vision of an integration of science and spirituality deeply rooted in a transcendental reality.

As we have already observed, the development of science and technology was due to the belief of a pattern and regularity inscribed into the nature by the divine. Thus, the practice of science and technology was initially based on an understanding about the divine and in the service of the divine and hence a sacred activity. Gradually, a reductionist tendency crept into the scientific endeavour and the sacred elements were eliminated and the divine was explained in terms of residue, erasing it from the human sphere of activities as a mere mythological factor. Science and technology has a great role to play in the secularization of the culture and the society in the twentieth and the twenty first century. When Laplace was asked by Napoleon that in his book *Le Celestial Mechanique* there was no mention of God, it was said that Laplace retorted back saying that I did not need that hypothesis to explain the mechanics of the universe. Also in the twentieth century when Youri Gagarin, the first astronaut went around the outer space, he claimed that he had searched for God and he could not find. The description of Dawkins, a renowned biologist, ‘God as delusion’ is also an index of the reverberating influence of the rejection of God, sacred and the spiritual by the science and technology. Also from the chaos and complexity, there is a tendency to explain the elements like unity, spirituality in terms of emergent behaviours. Perhaps because of these tendencies, humanity is facing a crisis, not only a mere ecological crisis, but a crisis in terms of the lack of truth leading to a crisis in faith ultimately paving for an all-out crisis in the culture leading to meaninglessness and hopelessness. Thus it is very important to look for the holistic account of humanity, in terms of something beyond it as envisaged in the beginning by the cosmologist Aristotle, a transcendent reality, that can only give meaning and hope to it in times of tribulations and misery.

Science and technology is making quantum leaps and trying to explain the realms of matter in terms of the ultimate particles like the quarks, the four forces which could be reduced into a single force explaining the symmetry of the universe; life in terms of the DNA, genes, codons, chemicals and understanding the coding of the ultimate language of life so that science could encode it; the description of mental life in terms of neurons and its parallel processing and the deeper chaotic dynamics; in short, the information technology, biotechnology, nano-technology and the neuro-technology claiming that they could explain, matter, life and mind in terms of its

constituent parts and filling up the gaps between them. However, then science and technology will be making the false claim of understanding everything in terms of its constituent observable parts, in a mechanistic reductionist explanation which could not adequately describe the richness of matter, life and mind. Moreover, science and technology is basically a life facilitating mechanism and it needs to be complemented by a meaning giving mechanism. Otherwise, there is the possibility of the inordinate developments of scientific tools like cloning, for destructive purposes ultimately leading humanity to serious crises like the ecological disaster, turning technology into a horror than a means to provide hope. It is also essential that the inclusion of the transcendent reality as the ultimate beginning and end of the cosmic processes, endorsing the role of the divine and the response towards it as faith and a belief in the spirituality and sacredness of the Supreme Consciousness can only guide the progress of humanity. A progress rejecting the transcendent reality and the elements of sacredness and spiritual outlook can only lead us to hopelessness, meaninglessness, fragmentation, isolation and crisis. Science and technology need to have its own other, the sacred to complement it and lead it to the realization of fullness in an absolute sacred reality.

Craig Dilworth who critically reviewed the dominant present world views and observed that: “if we consider the dominant secular and materialistic worldview of the present, clearly it has been conditioned by the physicalist metaphysics of modern science.”¹² Then he asks: “Could a new metaphysics succeed in laying the foundation for a new world view; and if so what would be the fundamental characteristics of such metaphysics?” Dilworth concludes with the following observation.

One aspect that there seems general agreement regarding, among those who have given consideration to the matter, is that the new metaphysics, like the biologically oriented, would have to give a central place to the notion of the whole, while at the same time recognising the success of atomism in its concentration on the importance of the part.¹³

As Dilworth has correctly discerned, the future will be for a vision which is biological in nature and which will give priority for holism incorporating the success of atomism. In short, as we are standing at the threshold of the twenty-first century, the vision of holism provides a new way to think about reality, awakening a fresh research outlook on its structures and a new methodology for sustainable progress considering humanity not as a fabricator, but as a custodian.

¹²C. Dilworth, *The Metaphysics of Science*, Dordrecht: Kluwer, 1996, 207-208.

¹³Dilworth, *The Metaphysics of Science*, 208.