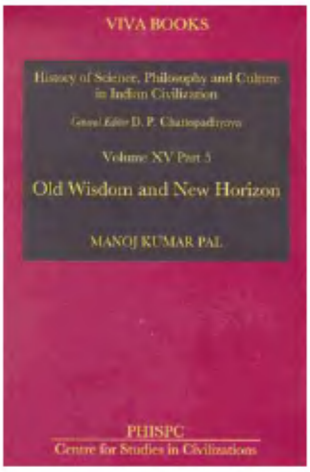

Old Wisdom and New Horizon. Manoj Kumar Pal. PHISPC, Centre for Studies in Civilizations, 36, Tughlakabad Institutional Area, New Delhi and Viva Books Pvt. Ltd., 4737/23, Ansari Road, Dayaganj, New Delhi. 2008. 495 pp. Price: Rs 1895.

The book under review is one of the series of volumes that are being published by the Centre for Civilizations Studies in Kolkata, under the General Editorship of D. P. Chattopadhyaya as a project of History of Indian Science, Philosophy and Culture (PHISPC). The book is authored by Manoj Kumar Pal who is an eminent theoretical physicist and Former Director of the Saha Institute of Nuclear Physics, Kolkata. The book is based on a series of 14 essays written over a period of time on topics relevant to the theme of the book. For this review to give a flavour of the contents and scope of the book, I will endeavour to present a chapterwise summary of the essentials as I perceive it.

In the very first article entitled 'Science, Religion and Philosophy', Pal traces the history of human development and civilization beginning with the acquisition of skills to light a fire, cook food and domesticate animals for a variety of purposes. This primitive period was followed by the systematization of knowledge acquired by observation of happenings in nature and in the sky above, which all led to rudiments of astrology which over a period marked a transition to astronomy which in turn is recognized as the first discipline in the realm of science. Pal presents a brief account of the Babylonian astronomy – the classification of stars, introduction of the equatorial circle, the equinoxes, etc. Following this he discusses the power of observation and analysis of the ancient astronomers of various schools Greek, Indian, etc., illustrating the case of the movement of equinoxes, which is quite a small movement and requires precise observation.

For the beginnings of religion and philosophy, the author goes back to the period 1000 to 5000 BC – to the Egyptian, Babylonian and Indian – (the Vedic period) ideas on creation. He then discusses the various phases of the growth of science – the earliest phase motivated by pragmatic needs followed by gathering of data on interesting natural phenomena and quantitative attempts at understanding them. This was followed by precise measurements and designed experiments to verify predictions – formulation of hypothesis, postulates, laws, etc. This heralded a mathematical approach to all problems.

The second chapter focuses on the role of 'seers and prophets' – those rare, noble and sublime individuals who gained esoteric knowledge through deep contemplation and meditation. In this connection he brings in the Aryans in India who left us the legacy of the Vedas (~1600 BC), the Upanishads and the Vedanags and presents in detail the rich treasure of the scriptures that have survived. There are also the upavedas which are more science-oriented – Ayurvada in particular. The *Charaka* and *Sushruta Samhitas* are of course, of a much later period. The author points out the apparent contradiction that exists in the Vedas between the concept of 'oneness' and of the many gods. Some of these issues are further discussed in detail in a later chapter entitled 'Wisdom of India'. Next, he deals with the role of prophets of the Jews who similar to the Indian sages had revelations, direct communication with Jehovah, the Jewish God. Moses was the first prophet wandering in the deserts of Sinai. He was the proclaimer of the ten commandments. The author gives an account of the early history of the Jewish settlements and the role of David in bringing together the different groups and becoming the sole king of Hebrews. David's son Solomon who ruled next got recognition for his political and military power. The first Jewish temple at Jerusalem was built by him. The author traces the subsequent downfall of Judaism and the spreading of Jews to various locations, Alexandria, Northern Coastline of Africa and the South of Spain. Jesus was born in Nazareth in 4 BC and his preachings appealed to the common people and he came to be recognized as the Messiah who will lead them to heaven. Gradually Christianity spread to Rome and gained official recognition by the Emperor in AD 325. The author gives a detailed and graphic account of this period and subsequent developments in the later eighth chapter entitled 'The Wisdom of Christianity'.

The third chapter of the book 'The Hellenic Legacy' begins with an account of the multi-cultural mix up that took place in the Aegean Islands and the emergence of Greece as the seat of a new civilization by 700 BC. However, it is interesting to note that in the middle of the sixth century BC, while Athens was consolidating her democratic institutions at home and her naval power in the adjoining bay of Salamis, and while Sparata was basking in the glory of armed supremacy in Greece, the real centre of power and civilization still lay in the Middle East ruled since 538 BC by the Archemenid Persian emperors. The very first Aryan empire of the civilized world was established in 538 BC by Cyrus. This was the largest of all empires of that date, which was later extended by his son up to Punjab. The next major landmark in the history of the period was the rule of Athens by that extraordinary ruler Pericles which led to all-round progress and prosperity – trade, commerce, art, architecture, literature and especially philosophy. Pericles is known in history as the one who formulated the democratic system of governance – wider participation of the free citizens in governance. Pericles died in 427 BC. The author then gives a brief description of the difficult period that Athens went through due to internal squabbles and the annihilation of her navy by her enemies. This lasted till the emergence of another leader Alexander the Great. There is a description of Alexander's invasions and conquests and his grand marches to several countries including India.

The subsequent annihilation of the Greece–Macedonian empire took place in the hands of the Romans. The Romans however had great admiration for the Hellenic culture. Latin, literature and fine arts developed by imitation of the Greek format. According to Pal, 'They (Romans) by nature were averse to philosophy – natural, metaphysical and ethical – subjects that call for deep contemplative abilities in which the Hellenic Greeks had excelled over their contemporaries. The treasure of such Hellenic thoughts that had survived the ravages of time, reached continental Europe, via Islamic scholars of Spain along with all the ear-

lier fruits of eastern and middle eastern intellectual achievements in philosophy, mathematics, physical science, astronomy, medical science – mostly in Arabic translations – and the Arab's own original contributions to algebra and alchemy (chemistry). The birth of modern science in Europe in the middle ages owes its origin to this precious heritage and particularly to the adaptation of the awakened European mind to the method of rational arguments based on the inductive and deductive logic, analysis and classification of observational facts of nature culminating in the formulation of the theoretical frameworks that quantitatively explain the observed phenomena and predict some more. Europeans spontaneously acknowledge their indebtedness to Aristotelian logic for the later day development of European philosophy and science. Only very recently liberal western scholars have started showing grudging awareness that the origins of some of the early Greek philosophy, logic and science can be traced to even earlier sources in the East – a point to which I shall return later in this book'. I fully endorse this point of view of the author.

There is also in this chapter a brief account of Greek literature and drama and the contribution of the historic personalities like Pythagoras, Zeno, Aristotle, Plato, Socrates and Epicurus and their philosophies.

The fourth chapter deals with the 'Old Wisdom of India' and is essentially concerned with ancient Indian philosophical systems which are much older than the Greek philosophies. The author presents first a summary of the Nyaya, Vaishashika and Sankhya philosophies. Basically, these philosophies have sought knowledge about the universe and the mysteries of *life* and *self*. They differ slightly from each other, but in essence constitute 'a unity in diversity' and seek *moksha* (release) as the end of cycle of rebirths. After rather detailed presentation of these three systems, the author proceeds to a description of Patanjali's *Yogasastra*, *Purva Mimamsa* of Jaimini, *Uttara Mimansa* of Vyasa. While *Yogasastra* is a systematic compilation of the practices directed towards achieving transcendental knowledge, the *Purva Mimasa* is concerted with the queries in 'Dharma', a term which though has broad implications in the India philosophical context, is restricted in *Purva Mimasa* to sacrificial rites (*yagna*) and charitable deeds or gifts (*dana*). The *Uttara Mimasa* is more concerned with queries on Brahman which is defined in this context as 'that which produced the universe, holds it and into which the universe ultimatary merges and disappears'. It is interesting and relevant to note that the Nyaya–Vaisesika philosophy claims Paramanus (atoms) as the ultimate constituent of the universe, and the Sankhya Patanjala Darshanas describe the creation of the universe as gradual transformation of prakrti or nature.

Chapter five is devoted to 'Other Religions of India', in which the author presents in some detail the two historically important religions Jainism and Buddhism. Jainism is older and is traced for its origins to the sage Risbha, a name that occurs in *Rig-Veda*. He is also called Adinatha. He was followed by 23 Thirthankaras (prophets, seers), the last being Mahavira (Parsvanatha). Jainism is quite distinct from Vedic Hinduism and Saddarsana discussed in the previous chapter. Jainism does not have the concept of God as its creator. It postulates the universe as self-existent having no beginning in time and both past and future being limitless. According to Jainism, the universe passed through many cycles of expansion and contraction.

The author presents in sufficient detail the historical development of Jainism and the role of Mahavira, a contemporary of Buddha, in formulating the tenets of Jainism, the ethical codes and metaphysical principles. Both Jiva (consciousness) and Ajiva (inanimate substances) are considered real, material and self-existent for eternal time. An elaboration of these ideas and comparisons and contrasts with Hinduism is given. A brief presentation of Jain logic which has novel features is also given. In Jain metaphysics reality is subject to changes and not a static phenomenon. Jainism continues to be an active religion in many parts of India.

Another religion that originated in India around 500 BC is Buddhism, which also was not in line with the ancient Hinduism based on the Vedas. The founder of this religion and philosophy was Gautama Buddha born in 564 BC. A good account of his early life and the sudden decision he took to leave his royal family with a wife and child, at the age of 28 and the rigorous life he spent under a tree in Bodh Gaya practising meditation and the enlightenment he got and the message he started preaching to his disciplines are all described in detail. A detailed comparison and contrast between the concepts of Hindu philosophy and the one that Buddha and his followers practiced is given. While according to Vedantha 'Brahman' is the only reality, Buddha considered this concept as unnecessary. Some aspects of Buddhist canonical texts in a summary fashion are also presented. Buddhism persisted and developed further in the later years under scholars like Nagarjuna. However, Buddhism practically disappeared from India, but took deep roots in several countries – Tibet, Sri Lanka, Japan, Korea and China where it continues to be a thriving religion.

Chapter six, 'The Earth's Diary' gives an account of the history of the earth and the advent of living beings on it in the process of evolution and the final emergence of Man. The geological history of the earth beginning from the crystallization of the rocks from the gaseous chemicals – the so-called pre-Cambrian era to the creation of the earth's environment, the Palaeozoic, era, the Mesozoic era by which time some of the sea animals, reptiles had appeared, followed by the Cenozoic era during which the Himalayas, the Alps, the Andes rose up and the land areas became like what they are to-day. During the last 20,000 years – the Pleistocene epoch, many flowering plants appeared. The author then goes into a fascinating description of the entry of the primates into the scheme of things on the planet earth which is supposed to have happened in the Cenozoic era about 40 million years ago and man as a primate appeared many million years later. The author gives an account of the gradual appearance of Peking man, the Neanderthal man and finally the *Homo sapiens*. The whole story of evolution on the earth is scientifically narrated in this chapter.

This is followed up in the succeeding chapter seven 'Prehistoric Man, Cultural Contacts and Evolution', which is essentially based on archaeological excavations of the pre-historic sites in Asia Minor, Syria, Palestine, Iraq, Iran, Caucasus, Turkistan, Baluchistan, Harappa, Mohenjadaro, etc.

The author presents a fairly long discussion on the Harappan civilization. Summarizing the main points highlighted in the review of pre-historic and proto-historic man, he points out that though in the early phases of human civilization there was 'Unity of Man' engendered by the common origin, a break occurred later due to the migration of militant nomadic tribes, which however, was restored and a new order of civilization emerged again due to linguistic resemblances and

cultural affinities and similarities. Cycles of unity and disruption have followed. Even though religions and politics have divided nations, the fruits of intellectual activities of man, philosophy, science, medicine and art have had the opposite influence of uniting.

The first part of chapter eight 'The Wisdom of Christianity' begins with the narration of the life of Jesus Christ from the time he was born to the time he was crucified and the story of his rising from the dead. Then there is an account of the growth of Christianity and the persecution of the Christians and how finally the `blood of martyrs became the seeds for the growth of Christian church', over the entire Roman empire. Following this, an account is given of the contributions of a panorama of leading individuals belonging to the period second century BC to 9th century AD, who played an important role in establishing a link between religion and philosophy in Europe. Among these are personalities like Cicero, Plutarch, Plotinus whose particular contributions have been spelled out. The ideas of Augustine on issues like God and Soul, the setting up of the 'monks' order by St. Benedict are also presented. Finally the theology of creation in Christianity is commented upon. Drawing upon his experience as a physicist, the author says: 'I now sharpen the focus of this analogy (with Grand Unification Theory of physics) on the conclusion I am driving at 'monism of Vedanta is a deeper view of what superficially appears as panthesiasm to Christian theologicians; there are principles akin to the laws of symmetry of physicists in God's scheme of this universe that make the God and His universe unified into one being. The necessary confirmation by experiments has been carried out by Vedic seers and other mystics who have experienced it at first hand'.

In the ninth chapter 'Wisdom of Islam', the author starts with a fairly long account of the life history of Muhammad, born in AD 570, as posthumous son of Abdullah belonging to the Hashemites tribe. Muhammad died in AD 632. The monotheistic and non-idolatrous religion of Islam is based on the Holy *Koran* and is the message of God received by Muhammad. He explicitly stated that God did not bestow him with any power to redeem humanity, who must seek redemption only by their faith in Allah, by following his commandments, maintaining moral and ethical purity in personal life and doing good deeds for Allah's pleasure. Allah is the uncreated creator of everything and everybody. While creating a living body, Allah breathes 'soul' into it. The duality of the body and soul persists till the Day of Judgement. Islamic eschatology comprises the concepts of Last Day of Judgement, resurrection and banishment to hell or heaven. The *Koran* categorizes different kinds of deeds and specifies the corresponding rewards or punishments that are to be meted out by god in this last judgement.

The author then goes into a description of the role of Holy *Koran* – the Holy Book of Islam. Muslims accept the *Koran* as the words of God and the whole book as a prototype of the original kept in heaven. Many stories in the *Koran* have an overlap with those in *Bible* and the Jewish scriptures (*Apocryphal*, *Talamad*, etc.). Though orthodox Islam does not permit translations, there are according to the author, forty such translations, in many languages including Urdu, Marathi and Bengali. There is a presentation also of the Islamic law for which also *Koran* is the source book. In contrast to Islam according to the precepts of Koran and Shariah, the individual is brought before God for the final day of judgement aeons after his death, Sufism, a variant of Islam, arose in the Middle East, as an alternate religion based on *Koran* itself, but which had appeal to those who wanted to enjoy as much as possible blissful spiritual experience at the personal level here and now. The successive stages of the spiritual life of a Sufi call for higher and higher degree of single minded devotion and dedication and engender a graded level of blissful experience. A write-up on Islamic education, scholarship and philosophy is also given.

The chapter ten is on 'Christianity and European Philosophy in the Middle Age'. This chapter begins with a narrative of the conflict between the Roman Church under the Holy Emperor Charlemagne, which had acquired supremacy in the western Latin Europe and the Greek church under the Byzantine empire (AD 1453) that had divided the Christian world. The two churches also had different views over the nature of Trinity. The author then goes on to deal with the crusades in Germany, the termination of the Byzantine empire by the Ottoman turks, the conquests of the Mongols under Chenghis Khan considered a great military leader hailing from north China and later the advent of protestant movement by Martin Luther.

A discussion follows on Christian theology and European philosophy in the period ninth to fifteenth century. This is the period characterized by Scholasticism which was essentially a group activity of several academicians. In the early thirteenth century Aristotle's works in various translations, Islamic science, philosophy in Arabic and Jewish philosophy born in Spain, percolated into European scholasticism and influenced it a great deal. Some of the translations of Aristotle's works however, were so bad that they had adverse influence much later even on Roger Bacon, the first exponent of modern science. On the contrary, St. Thomas Aquinas accepted in toto Aristotle's concept of soul – soul is the form and the body the material that is in an inseparable union, constitute the real substance called an individual man. But Aquinas deviated from Aristotle by adhering to the Christian faith that God created the world.

Scholasticism died out in many centers of Europe by seventeenth century. A new orientation to man's understanding of Nature began to take shape by the evolution of physical sciences – the coming on the scene of pioneers like Copernicus, Kepler, Galileo and Newton. Modern science had begun, the renaissance period in Europe followed – upsurge in language, art and architecture, etc. Over a period of time the English philosophy under Francis Bacon turned to Empiricism and the European Modern philosophy into Cartesianism though Spanish philosophy remained Scholasticism. Another important figure of this period is Spinoza, who in his short life of 45 years, made significant contributions to philosophy. Spinoza avoided the crucial problem of the communication between *res cogitans* (I) and *res extensa* (extended subtle) of Descartes by positing the existence of only One substance which he called God or Nature. There is a brief presentation also of Leibniz's Monads theory and Bertrand Russell's criticism and of the creative philosophers Voltaire and Rousseu. This enlightenment period in France had a parallel in Germany too. The names of Kant, Fichte, Schelling, Hegel and Schopenhauer ring in this connection. The corresponding American philosophers of this period are Emerson, Thoreau, Prince, William James, John Dewey, George Santayana. In the last section in this chapter, Pal examines to what extent

Christianity provided the motive force behind the phenomena of domination of Europe and later that of America, over the whole world.

Chapter eleven is a discussion on 'Science in Ancient Civilizations' – the remarkable feats in the engineering technology of the Egyptians in the construction of pyramids, the Babylonian, Indian, Greek and Chinese in mathematics and positional astronomy, the contributions of Aristotle to biology and so on. The author then switches to an elaboration of the contributions of the Chinese civilization, one of the most ancient ones to philosophy, religion and science and highlights the work of Confucius, Lao Tse and the arrival of Buddhism to China. The technological achievements in agriculture and water management, iron smelting, biological manures, discovery of the magnetic load stone are highlighted. Chinese astronomical records going back to very ancient periods are astounding.

The author then shifts his attention to Indian Astronomy in the three periods – Vedic (up to 1350 BC), Vedanga (1350 BC–400 AD) and Siddhanta Jyotis (400-1200 AD) and has given a succinct description of the Indian work on the planetary astronomy and the corresponding developments in mathematics – geometry, trigonometry and arithmetic, with a reference to the contributions of the more recent Kerala mathematicians.

This is followed by a fairly long section on 'Methodology and classical sciences'. In a regular textbook-like fashion, the author begins with an explanation of the coordinate systems, Newton's laws of motion, simple harmonic motion, scattering and focusing of light, Maxwillian distribution, etc., the formation of the periodic table, the chemical bonds and so on. All this is written very well and in a simple and elegant manner. He concludes this section by an account of the theory of relativity with all the equations and transformations leading to the two important results – (i) the equivalence of mass and energy and (ii) moving mass is larger than rest mass. It would have been preferable if in the book version, the mathematical portions had given as an appendix.

In the twelfth chapter, 'Quantum Theory – Philosophers' Delight' the author describes the crisis that arose in classical physics at not being able to explain the experimentally observed energy distribution of the radiation from a blackbody as a function of the wavelength of the radiation. The Planck's 'quantum hypothesis' eliminated this difficulty and Einstein used this quantum hypothesis to explain photoelectric effect. The author gives a detailed account of these developments supported by the necessary mathematical equations and the relevant experimental observations. These developments have immense influence on the philosophical aspects of science itself. Determinism which characterized science till then was replaced by probabilistic – interpretation, uncertainty was recognized as a fundamental feature of nature itself, the particle-wave duality led to the fundamental questions of observer dependent reality and reality became non-local. These are discussed in sufficient detail in this chapter. The author's reflection is also given on the role of consciousness in quantum mechanics and the Upanishadic concept of self-consciousness and Brahman. Here also from the point of view of the general reader, the mathematical aspects could have been given as an appendix.

In chapter thirteen, 'Life and Consciousness' the author starts with an account of Charles Darwin's theory of evolution followed by Gregor Mendal's ideas based on his experiments on hereditary characteristics and then goes on to the role of DNA and RNA as constituents of genes and agents of reproduction of the characteristics of life. He then discusses the philosophical and spiritual impacts of these new developments in biology.

In this connection the author raises questions like 'what provides the urge for DNA molecule to replicate?'. Since the individual is born with all the hereditary traits coded on the genes, 'how do we account for the role of free will'? And many more questions of a similar nature. He discusses the application of chaos theory, and the role of self-organized biological systems. He then outlines the present trends in neurobiology to understand the functioning of the human brain and the attempts to interpret self-consciousness of humans.

The last chapter fourteen, 'General Relativity, Astrophysics and Cosmology' is a fairly long one. The section on the General Relativity is again quite technically presented. The General Theory deals with the equivalence of inertial and gravitational masses, the gravitational field, curvature of space, bending of light in a gravitational field, etc.

The astrophysics section deals with the variety of all the celestial bodies and their special features – the stars, the clusters, the galaxies, the expanding universe, the universal microwave radiation, the condensed collapsed objects like neutron stars, balckholes, the quasars, the pulsars and also the stellar explosions – the novae and the supernovae. The last section on cosmology is concerned with the physical theory of the birth and evolution of the whole universe. The most popular theory at the moment is the Big Bang theory with an inflationary theory of the early universe built in. The Big Bang theory is described with the necessary mathematical equations in place. There is also a reference to the newer developments in astrophysics pertaining to the existence of 'dark matter' and 'dark energy' which overwhelm the ordinary known matter by a large factor when one considers the energetics of the universe as a whole. The embarrassing situation is that the known type of matter and radiation is only 2.5%, the remaining being of an absolutely unknown character, but having attractive and repulsive gravitational effects.

The Big Bang theory of creation of the universe naturally conflicts with the religious ideas of creationist theories in the *Bible* and other scriptures. The author discusses these contradictions and presents his views on them.

The book is certainly a mini-encyclopaedia of valuable information content on the histories of science, philosophy and culture. The Indian contributions are discussed in the general background of the developments the world over. The author being a reputed scientist has ensured clarity, rigour and authenticity in presentation despite the range of topics he has covered being vast and diverse in nature. He has also provided extensive notes and references.

I am sure the book will be welcome by the discerning readers, be they scientists, philosophers or religious men. In my opinion it is a must for any library that wishes to have books that cover the three main bodies of knowledge – science, philosophy and religion. It will be a good resource book for students pursuing interdisciplinary studies.

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