" The Universe is a hypothesis " .

-- De Sitter.

Idea of the ' Universe ' which by definition includes everything[1] is a grand and sophisticated one of the human being. At the dawn of human civilization man was astonished at the beauty of moonlit night ; the congress of the stars above on the sky of dark night . He became eager to know how and by whom the whole of the Universe had been created . " Eong srstī kūta ābabhūba " .

Human idea about the creation of the Universe is not a singular one rather varied ; as man looks at it from many different points of view. The Universe presents one aspect to the philosophers, another to the scientists and still another to the artists. Notwithstanding the fact that it is beyond the capacity of a single person to describe the Universe in all its manifestations, man seeks a unification of different ideas of creation and evolution of the Universe.

(i) THE PHYSICAL UNIVERSE

By ' Physical Universe ' is meant the totality of space and all it contains. More accurately it may be defined as the totality of space ; time and matter ; or again as the space-time-manifold.

In very recent time our knowledge of the physical Universe has been vastly extended through the co-operative achievements of the

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1. Narlikar, J.B. " The Structure of the Universe ", Oxford University Press; London, 1977. p.1.

science of astronomy, mathematical physics, and astrophysics; assisted by the art of photography and spectroscopy and by our marveiousely perfected telescopes. The rapidly accumulating knowledge of this physical Universe ought to satisfy the hypothetical Universe of the philosophers and scientists. Our present picture of the Universe is necessarily ought satisfy the wondering students of philosophy.

Our present picture of Universe necessarily depends upon our present knowledge and there is no reason to believe that this knowledge has been reached a perfection at the time of writting this thesis. From the history, it is evident that man's view of the Universe has changed steadily with time.

The principal object of our proposed thesis is to examine the view of the creation as well as the evolution of the Universe as studied by the scholars of the ancient time and by the scientists using the various observational technique at their command and interpretation based on the laws of science in Western country and at the same time the notions of creation and evolution of the universe in the light of Indian philosophical literature which have been developed depending upon the intuitional and rational thinkings of the ancient philosophers and seers of India. An attempt will be made to find out parities and disparities between these two disciplines.

In order to elaborate the discussion we should realize that our present picture of the Universe necessarily depends on the different kinds of epistomologies. Few of these are described below :-

(1) SPIRIT OF ENQUIRY IN OCCIDENT.

Science everything is but an apparition
Perfect in being what it is,
Having nothing to do with good or bad.
Acceptance or rejection
One may well burst out in laughter.

- Longchenpa; Tibetian Buddhist.

The ancient Greeks who first studied philosophy in systematic way; began with the following questions.

In what order shall we persue our philosophical enquiries and with which one we begin? Will they group themselves into some so that we can get a bird's-eye veiw of them at the begining? When a little girl looked out the window and asked her mother how there came to be any world, how did it get started,, and how it grew to its present state? The ancient Scientistis who were essentially philosophers began also with these questions. They called them COSMOLOGICAL enquiries.

A. COSMOLOGICAL INQUIRIES.

This process begins with the study of cosmology, inquiring first about the cosmos; or the Universe and about the nature of Space and Time. Then we may ask about the Earth and the first begining of Life on the surface of the earth. Then we will follow easily study of the Evolution of life, and this will suggest the

problem of its Purposiveness, if have any. Teleology is the name given to the study of purpose or design in nature.

The first group of problems we may put in tabular form as follows:-

I. Cosmological Inquiries	The Universe, Space, Time,
	The Origin and Nature of Life,
	The Philosophy of Evolution.
	Is there Purpose or Design in Nature,

B.ONTOLOGICAL INQUIRIES.

Ontology signifies as the branch of metaphysics treating of FIRST PRINCIPLE. It is our inherent tendency to reduce every thing to some final unity or elementary STUFF and when a certain unification of all phenomena is found, it is recognized as 'MONOISM'. If it is thought that the matter is only the ultimate reality it is callced as 'MATERIALISTIC MONOISM' or just 'MATERIALISM.' When it is thought that the ultimate reality is not matter but mind or spirit; the view is called 'SPIRITULISTIC MONOISM' or SPIRITUALISM. Sometime it is called 'IDEALISM.'

On the other hand 'DUALISM' where two ultimate forms of being exists and 'PLURALISM' where it is found difficult to solve and the various answer are not quite satisfactory.

Thus ontological inquiry may be represented as follows:-

ONTOLOGICAL INQURIES	MONOISM,	MATERIALISM. SPIRITURALISM OR IDEALISM.
	DUALISM,	
	PLURALISM,	

C. THE PHILOSOPHY OF MIND,

Next, the most urgent and intimate kind of inquiries about the MIND. The psychological inquiry such what mind is, whether it is different from the sould and how mind is related with the body etc. Finally, whether it is different from the soul and how mind is related with the body etc. finally whether soul is immortal.

All these would be seen to by psychological inquiry constitutes an imperical science known as PSYCHOLOGY. In tabular form these inquries will appear as follows:-

III. The Philosophy of Mind	The Search for the Soul,	Historical. Reconstructive.
	The Relation of Soul and Body.	
	The Freedom of the Will.	

D. THE HIGHER VALUES OF LIFE.

There are two kinds of values that emerges in studying modern science and its philosophy, namely, religious values and asthetic values. Modern science is not silent about GOD and this leads us to the study of religious values of life . The, aesthetic values, or the study of beauty, as exhibited in nature.

The Higher Values of Life ----- Religious Values.
Aesthetic Values.

(2). THE SPIRIT OF INQURY IN EASTERN PHILOSOPHICAL LITERATURE.

(i). HINDUISM.

Throughout the history of man; it has been recognized that the humane mind is capable of having two kinds of knowledge, or two modes of consciousness:-(a) RATIONAL (b). INTUITIVE which are associated with with Science and Religion.

Ever since the time of the Upanisds Indian has tenaciously held a view of religion which makes it a high adventure of the spirit; a converging life endeavour to realize and grasp of hidden meaning of existence. Faith in India did not mean a cozy belief to rest by; but a touch to set the soul on fire with a desire for spiritual realization.

A spiritual value of religion as different from a crude dogmatic veiw, makes religion not only cultivate a spirit of tole-

ration,questioning and inquiry in its own sphere but also foster it in every departments of life.The Bhāgavad Gītā (VI 44) declares that a spirit of inquiry into authority of the words of scriptures and mode of tradition.He becomes a mere believer.India regard "SĀDHANĀ" as the experiment as the dynamics of religion;it has resources to jijñāsā or inquiry into the nature of "Brahmanjijñāsā"inquiry into the nature of Brahman i.e.GOD as true oneself of all,or "Dharmajijñāsā" inquiry into dharma i.e.social ethics and personal morality.Brahman is real,shining and immortal;thus a hindu prayer.

"From the unreal lead me to the real,
From darkness lead me to light,
From death lead me to an immortality,

-Chhāndogya Upaniṣd.

(ii).BUDDHISM.

As for Buddhism the word 'Science' means the Practical and dialectical approach of the human problem and to find a Universal solution of the inherent problems so that ultimately one can obtain COSMIC NIRVĀNA.

The Buddhism explain beautifully the puzzling harmony of the cosmos without any restoring to the mysterious and unknown force as 'GOD'.Here like everything else, the universe of mind and matter-the cosmos is bound by laws.The universal law of cause and effect works every where in case of physical plane,or in the mental plane.

JAINISM.

Jaina metaphysics

Jain metaphysics is realistic, since it admits the objectivity of the material world and tne subject - object process of knowledge. When we reflect on our experience we can rudimentarily distinguish three basic aspects; substance (dravya) , which is an uncreated and uncreated and indestructible entity underlying all changes; the quality or attribute (gūṇa) are inseparable. From this point of view reality is unchanging. But from the ppoint of view of the changing modes reality is changing, momentary, unreal. Since reality has infinite aspects, our judgements are necessarily conditiond, limited and relative to the individual. Reality is manifold or pluraalistic (anekāntavāda).

(3) MYSTICISM.

" Mahābisve, mahākāshe mahakāla mājhe ;
Āmi manab bhramī ekā bismaye."

-- Rabindranath Tagore.

" In the endless universe of vast space and time -
I, a man; wander alone with awe ".

In primitive days man looked at the starry sky above with awe and wonder. A sense of existence of divine mystical power prevailed in his mind at the sight of these liminaries. Again man is primarily absorved in the terrestial enviorenments and was also charmed at the beauties of the earth. This sense of awe and wonder gave rise to mysticism or mystic experience of man.

The word ' MYSTICS ' (MYSTERION) came from the Greek verb ' muo ' , to shut or close the lips or eyes. A mystic to Greek was one who had gained a secret knowledge of divine things and been rebron into eternity.[1] Mysticism is intimately concerned with what may rightly one of eternity and timelessness.

The original idea of mysticism, which has changed and extened in the course of time, assume different meanings. This may be evident from the Greek philosophy which occured in the centuries came into play as a result of fusion of Christinity and Neo-platonism in the early century of the Christian era,* a system of mystical theology came into existence. Mystical elements enters into the commoner in the form of religious experiences and when the religious feeling exceeds the

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1. Happold, F.C. " Mysticism; Penguin's Books, England, 1984. p-18.

rational ideas of man, mystic sense came into play but it is a matter of much discussion; whether the religions follow mysticism or mysticism follows religions. It will be wrong to consider mysticism as irrational ideas rather in true mysticism there is an extension of normal consciousness and there is a release of latent powers and widening vision. In consequence, aspect of truth may be expressed with the help of a rational intellect.

Mysticism is considered as the inspiration of philosophy, poetry arts, music and science. This is a " consciousness " of a " beyond " of the external world of material phenomena; or of an unseen over and above the seen. In the developed mystic the consciousness is present in an intensive and highly specialised form.

Science, a superb consciousness of man, evolves gradually for appreciation of the ultimate values of things which constitutes the spirit of mysticism.

In fine, it may be mentioned that religion; philosophy, arts, music and science whose source is mysticism are not worthy to be considered as the separate entities of human consciousness; rather they are interwoven, as if they are the different strings off a Universal " SITER " for a melodious harmony in cosmological concert.

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* Neoplatinism meant a particular sort of approach to the whole problem of reality in which intellectual and more specially the intuitive faculties came into play. Neoplatonism is a religious philosophy which connects itself closely with the consciousness of evil and felt need of salavation. So, it presuppose naturally a certain dualism in the ethical life and such a dualism take easily moral universe a form. This consciousness tends into a good principle and principle of evil. - "History of Philosophy" A.K. Roger. The Macmillan Company, p. 14.

(v) SCIENCE.

WESTERN SCIENCE

" When ' Science ' from creation's face
Enchants veil withdrawn;
What a lovely visions yeild there place
To cold material laws ".

- Thomas Cambelle.

Modern science has been originated from western logical and rational thoughts to understand the phenomena of the physical world. Science is not only a matter of collecting of data as the most of the human society of the world thinks. It is also , and more fundamentally, an attempt to gain insight into or understanding of the structure and working of the Universe.[1]

Latin word " SCIENTIA " means vast knowledge, and its equivalent word in German is " WESSENSCHAFT " which signifies not only the study of history, philosophy and physiology as well. Infact the exact significance of the English word ' SCIENCE ' is not much sophisticated to embrace the schools of modern science. However, according to the Western idea ' SCIENCE ' may be defined as ' the rational knowledge of the exposed world with the help of one's variable sense '. But this definition can not be acceptable to all and cannot be true in all aspects.[2]

Science generally deals with the materials which are perceptable to our sensory organs directly. But these sensory organs could not always capable of percepting all the natural pheno-

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1. Ovendin, F.C. " Life in the Universe ". Doubleday & Co., New York. p. 14.

2. Dampier, Sir W.C. " A History of Science, Cambridge University Press, 4th. Edition, 1948, pp - XIII.

mena.To nullify the defects of sensory organs the Western science takes the helf of instruments. In scientific methodology the radcal intuition and rational observation will lead to another scientific inference and new hypothesis or law shoild be explained in the light of other previous verified and established hypothesis and laws.

Science cannot be recognized totally as natural or materialistic;if it so;it cannot be treated as the rational and logical study of the human and sociological phenomena.Again the study of medicine which is related to man,is also included in science and even the various type of arts also find their places in the domain of science.Now-a-days the study of science has been tried to make methodical in the place of subjectwise and the scientific difinition of natural 'Science' is methodical trustworthy and e exact study of different material and materialistic phenomena.

Along with the evolution of the methodology for the study of different natural phenomena and materialistic phenomena;the ideas and philosophy of life also been undergone evolution and the gradual developement of the human intellects have also occured.As a consequence socialogical;cultural;religious aspects of human being are also evolved.In occident the process of intellectual developement may be deemed to be started markedly from the period of "RENASSIANCE" in Europe.

With the aid of some established principle of "Natural Science" some of the intellectual persons;managed to device some

technical developements to make day-to-day life of human being on this earth more easy and cosy and they are known as "TECHNITIANS".They deal with the known but a 'SCIENTIST' seeks to know the unknown nature of physical relations.

Commoners considers "Technitians"as "Scientists" and in a high sounding phrases they hail the "Technology" as "Science". Radio,Television;atom bomb and rocket etc. predominates the idea of scientific principles of the common people who consideres the rocket as "SCIENCE";but in actual scientific sense the rocket itself is not the subject matter of science but the principle of soaring high above of the rocket is to be considered as "SCIENCE"[1]

It had been recognized that the living creatures had appeared on this earth due to evolution of a single living cell millions of years ago and creature akin to 'man' on the surface of this planet 1 million years ago.As such;man is quite yonger to the living creatures of the earth.In other senses man has not yet crossed his boyhood;so far as their evolution of intellect is concerned and hence,human intellect and rational thinkings are quite immature even upto-date.

Modern science had reached to a most elavated position due to evolution of scientific thoughts and ideas of human being. It is astonishing to observe that the scientific ideas in their truest senses have been developing within the period of last four hundred years from the date of writting the thesis.This period is quite short one;yet the domain covered by this period is an enormos one.

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1. Zukav, Gary, "The Dancing Wu Li Masters, Flamingo, U.S.A. 1988, pp-36.

At present the spirit of the scientific enquiry according to A.Einstein:- "A supernatural cosmic sense is the source of eternal desires for studying science and finding out the absolute truth."

Scientists are engaged to unfold the Universe,the handsome 'COSMIC LOTUS' consisting of thousands of fragnent and hued petals;with the helf of their rational and sincerest endeavour. As these petals are being unfolded one after another,scientists become astonished at the beauty and sweet aroma of the petals. They find there is no end of the exquisite petals.The whole domain of scientific world is filled up with sweet fragnance and colour that of a lotus.

Science has got no closed chapter.

VIJÑĀN. (SCIENCE).

(a). HINDU PHILOSOPHICAL LITERATURE.

"Apaeyamītastvanayang prakṛting bīddhī me parām;
Jīva bhūtang mahābōho yaeydang dhāryate jagat".
— Gītā

"Besides the eight types of parāprakṛtī (Inferior or non-living), I possess another type of Prakṛtī (nature known as 'parā). O! Mahābaho, you should know this sustain the whole Universe."

In Hindu philosophical literature VIJÑĀNA may be considered as synonym of 'Science' in western view in a limited aense. The aim of Vijñāna is to seek the underlying cause of the creation of the Universe as well. Methodology of these two varied but the goal of these two are almost the same.

According to Hindu philosophical literature there are three categories of consciousness viz.

(i). Ajñāna-- Absence of suitable consciousness.

(ii). Jñāna-- Consciousness of human being due to some dynamic experiment signified as 'Sādhanā' and intuition obtained therefrom. Knowledge about literature; arts, philosophy and religion are the objects of Jana.

(iii). Vijñāna- A special category of consciousness which is recognized as "Nīschaitmaka Būddhī". With the helf of which one can reveal the nature of 'Brahman'; the absolute and ultimate of the universe. It is recognized as 'Brahman Vīdyā'.

In epistomology, Vijñāna, we come across (a) Parā Vīdyā and (b) Aparā Vidyā.

In the Mūndaka Upanīsd we find a question put by an earnest pupil to a great teacher:[1]

"What is that reality; O blessed one, by knowing which we can know all that there is in this manifested Universe?"

To this question the teacher gave a very significant reply. Two arethe Vīdyās or science to be acquired by man, so says the knower of Brahman. As mentioned above one is called 'parāvidyā' and the other is called 'Aparāvīdyā'[2] which is ordinary knowledge.

Though the Upanisds were considered as the abstract philosophy of life but they also explain the formation of natural scientific view of east. The different scools of philosophy not only explain only the philosophy of life, but also at the same t time explain the formation of hypothesis of natural scientific view of east. The different schools of philosophy also attempt to explain the scientific laws. According to Sāmkhaya-Yoga philosophy the universe is formed due to the gradual evolution of matter and soul. In the Nāya-Vaiśeṣīka philosophy, structure of the universe are recognized. Some similarities between the laws of motion of Newton; of the moving bodies are evident in Sāmkhya school of philosophy.

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1. Mūndaka Upanīsd. Chapter I, verse No. 3.
2. Ibid, Chapter I, Verse no. 4.

(b). SCIENCE IN BUDDHISM.

As for Buddhism the word 'Science' means the practical and dialectical approach of the human problem and to find a universal solution of the inherent problems so that ultimately one can obtain COSMIC NIRVĀNA.

According to Buddhism,there are five orders in nature a and the "Bīja Niyama" or the order of seeds and germs is one of these.It tells how rice is produced from the rice seeds and not from other seeds.Sugar taste sweet from sugar-cane and so on.The sperm and ovum too belong to this order of seeds and germs.Life must come from antecedent life.

Physical enviornments effects only the physical organism, it does not effect the invisible;unknown life-principle within the organism.What makes different beings behave in the several and different ways they do?

Buddhism solves these mystery by saying that invisible and unknown life-principles within the organism- viz. within the beast and another beings;is effected mainly in two ways by the KAMMA NIYAMA. The Act and result and the CHITTA NIYAMA;the order of psychic law.To know how two orders operate we must analyse an unit of consciousness.

Just as in the realm of matter,different particles of known substances produced due to combinations of three kinds of fundamental particles;like proton,neutron and electron.In the mental plane;a similar state of affiars exist.And consciousness

results from combination of what we might say; are psychological nucleons and electron.

(c). SCIENCE IN JAINISM.

Jaina's view of 'Science'are the measure to attain perfection.This is considered as constitutional or innate.On that ground Mahāvīra upheld thenecessity of austerities and discipline,education and training for the highest purpose.

In Jaina metaphysics we come across the idea of realistic and relativistic pluralism.It is called 'ANEKATAVĀDA' or the doctrine of the manyness or reality.There are innumerable material atoms and innumerable individual souls which are all separately and independently real.

Jainas believe that the universe function through the interaction of living souls (Jīvas;literally lives)and five categories of non-living(Ajiva);ether(Ākāśa);the means of conduction of rest(Dharma), time(Kāla), and matter(Pūdgala). Souls are not only the rocks and running water and many other objects.Substances are not looked as living.

The soul is naturally bright;all knowing and blissful. 'KARMA' is the subtle matter which is quite invisible to man. This is immortal entity of other systems interpreted materialisticaly.The naturally bright soul becomes dim and clouded over by 'KARMIC' matter and thus acquires first a spiritual and then a matrial body.Karma unites with soul as a result of activity.

(5). EVOLUTION OF SCIENTIFIC THOUGHTS IN WEST.

PHYSICAL SCIENCE.

" Our idea of the universe as a whole remains as the product of our imagination'".

-Whitelow.

The origin of physical science can be traced back in the observation of natural phenomena of the Universe, such as the various devices with the help of which man strove to increase the safety and comfort for their lives.

But in an early prehistoric stage man almost universally took a wrong ideas. Magic, mystery, astrology and the religion of the prehistoric era have clearly to be studied to know the general developements of the origin of the Universe.

Evolution of scientific thoughts of West has followed the different stages is traced out below:-

(a). THE EARLY PERIOD.

In the early period scientific ideas with its close associates-the philosophy- were nourished in the cradles of Greek c civilazation. In the 6th. century B.C. Milesian school of Ionia tried to discovered the essential nature or real constitution of things which they called 'PHYSIS' from which the term 'PHYSICS' has been evolved. They thought matter is alive and there is no distinction between living and non-living; spirit and matter existed.

Thales found cause of everything is 'WATER' and thus att-

empted to find out mysterious substance of the ' COSMOS '. In the later stage Anaximinder (610 - 545 B.C.), Pythagores and his followers said that the world consisted of earth, air and fire which were supposed to be divine. Pythagoreans thought that the world consisted primarily of mind or just as Aristotle considered that there is ever moving sphere of the outer heaven and the unmoved mover who must keep it in motion.

THE MEDIABLE PERIOD :

During the mediable period, extending from 12th. and 13th. century a vital urge to the development of culture was derived from Judio-Christian concept, which considered creation of things out of nothing - CREATO EXNIHILO . In the early mediable period the influence of Christian Church and from the influence of platonic idea.

In the 13th. century Thomas Acquino's scheme - Scholasticism - derived from Aristotle's idea explained natural phenomena in a rational way.

THE RENAISSANCE PERIOD :- 15th. - 16th. century.

The scientists and philosophers of this period themselves could not be free from the influence of the two Judio-Christian concepts viz. (a) God creats everything at His suit will (b) the doctrine - CREATO EXNIHILO . At this period a senses of " FREE WILL " changed totally all the hypothesis which existed prior to the period of RENEAISSANCE in Europe. Ideas of time, distances , mass and temperature had been changed as they were measured quantitively.

DETERMINISTIC THEORY.

Thought of the idea of evolution of scientific concepts deemed to prehistoric era, in fact, Newton's theory every phenomenon of the Universe is determined by cause and effect. The sun, the stars and the galaxly are moving in a definite paths and the Universal Gravitation is the root cause of these and a definite postulation is there for establishment of the Newton's speculation.

PROBABILISTIC THEORY.

With the formulation of (a) theory of relativity (b) Quantum mechanics (c) Heisenberg uncertainity principle, the methodology and scientific ideas have been undergone a profound change in solving the fundamental questions regarding truth.

Before the discovery of these principles it was considered that the science had solved the mystery of the Universe by knowing the nature of the ultimate principles constituting it. But with the discovery of the quanta of energies which moves in a discontinuous manner are of wave nature and the particles with mass have got the characteristics of wave form and follow the law of uncertainty in exhibiting the properties as the particles or wave form, a new type of idea has emerged for scientific study.

The formulation of uncertainty principle proves that a strict law of cause and effect does not apply in the world of subatomic particles. Theory of relativity has proved that all the scientific

knowledge based on sense perception is only relative.

Another important idea of theory of relativity is that consciousness of an observer and the act of observation should be with reference to the same frame of reference. Hence purely objective description between the observer and the observed.

SUPERDETERMINISTIC THEORY.

Science now looks forward to a higher kind of determinism of " SUPERDETERMINISM " which rules, guides and determine the UNIVERSE at a far level. Ordinary determinism states that once the initial situation of a system is established, the future of the system is also established due to inexorable laws of cause and effect. According to ' superdeterminism ' not even the initial situation of the Universe could be changed. Not only it is impossible for things to be other than what they are, it is even impossible that the initial situation of the Universe could have other than what we are doing at any given moment, it is the only thing that evern was possible for us to be doing at that moment.

THE IMPLICATE ORDER :- THE UNBROKEN WHOLENESS.

According to this elementary particles are not an independent existing any atabke entity. It is in essence a set of relationships that reach outside to other things. Here parts are seen to be in immediate connections in which their dynamic rela-

tionships depend on an irreducable way of the whole system. Again this in its turn depends to another broader system extended ultimately into the entire UNIVERSE. Thus one is led to an irreducable way of the whole system.Thus one is led to a new notion of unbroken wholeness.This unbroken wholeness denies the classical idea of stability of the world into separately and independently existing parts.Next question arises what is the 'IMPLICATE' order made? It is made of the same implicate order of that which 'IS'. And that WHICH IS cannot be termed in space and time.Description is totality incompatible with what we want to say.

(6). EVOLUTION OF SCIENTIFIC THOUGHTS IN INDIA.

(a). HINDUISM.

"In India,through all periods the special science are r rooted in and developed the underlying unifying COSMIC concepts and and presupposition.The scientific results is only a special case and phenomena which demonstrate, as it were, tthe Universal COSMIC LAW."

The Scientific acheivements of the Indians are closely releted to their national character,and this has ingluenced them on other work.What strikes most students of history of Indian scholarship is the excessive developement of the imaginative power of Indians.In any work,some imaginationtion is abso-

lutely necessary. Its exceptional or prominent developement, however, becomes a setback; it alinates a person from reality. This is applicable to a major extent to the Indian methods of work. Such disposition of the people, it is clear, made them take up primarily those sciences which were dominated by the method of speculations.

As regards experimental science, one cannot say that Indians did not at all know experiment and odservation. On the contrary they were very good observers. During the glorious period of Indian philosophy they had got the idea.

Indian Physics represents the transition state from pure philosophical speculation to experimental science, We find in India number of cosmogonic system gradually passing over from mythological conceptions to distinctive scientific theory. The earliest system that is fit to be called scientific is the Sāṁkhay. According to it, the whole world with all its diversity all the plants and the entire world of animals every thing is basically and essentially material. This diversity includes not only the inert mass but also active forces and conscious processes, yet all these are derived by evolution from primeval matter. This system cannot be called materialistic, for here a special conscious constitutes is assumed to exist separately from the matter. This conscious constituents is assumed to exit separately from matter. This conscious constituent is present in the process of evolution of matter; as it were, but it does not participate in it. By itself it is absolutely inactive.

The history of evolution of natural science in India is comparatively new and comprehensive account of Indian science yet to be written. Begining with the earliest known Indus civilization, the Indus Velley, with its pottery wheel, cotton textiles, and two wheeled carts constitute the study of ancient science in India. By the begining of the third millenium B.C. in India as in China, Egypt and Mesopotomia scientific developement was well advanced.

In ancient India, as in Grece, there was much speculative thoughts about astronomy, mathematics, physics and biology.

(b). BUDDHISM.

Both the schools- Hinayāṇa and Mahāyāṇa-admit the reality of the existent of external things. But whereas the former holds that these can be only be inlerred, the latter holds that these can well be directly apprehemded. It is difficult to form a definite idea about the former's position, for no important text of the school has come down to us. But in the case of 'Vaivāṣīkas' one of the most authoritive texts on the system, the "ABHIDHARMA-KOSA" of Vasūbandhū, along with the author's 'BHĀṢYA'.

Besides Śamkara comprising both under the name of 'SARVA-ASTIVADINS' gives, in the form of a very brief sketch, their veiws on the elements and atoms in the following words:-

"these Buddhists acknowledge the four elements,earth,water fire and wind,with their properities and products,in culiding the organisms of sense,the four elements are atomic."

To the above some additions may be made on the basis of the Abhīdharma-Koṣa and its BHĀṢYA.

According to it,things (dharma) may first broadly divided into two classes-'SAMASKṚTA',the ones that are a caused and 'ASAMASKRTA'the ones that are uncaused. The Samskṛita ones again,are said to be of five kinds,called 'SKANDHAS' namely (i).Vedanā-skanda (ii).Samjňa-skandha (iii).Samskāra-skandha (iv). Vijňān-skandha (v).Rūpa-skandha.

Of these five,the last one only has got the reference for present discussion,for matter and its different forms are all included in it .Thus,under the head of the Rūpa-skandha we have (besides others),the five senses organs the visual,the gastatory, the auditory,the alfactory and cuteneous. These according to the Vaibhāśīkas, are only special forms of transformed matter (bhūta-vīkāra-viśeṣa) the five objects of the senses(Viz.rūpa,rasa,gandha,śabda and spraśtavya),and the four material elements (viz.e earth,water,fire and air).

The atoms constituting objects of the five senses are stated to be of the nature of atoms dissimilar in kind to the atoms constituting the others.

The four material elements viz.earth,water,fire and air-also are atomic.They have two kinds of properities,natural

(SVABHĀVA) and derived (UPADĀYA). The natural properties of the four are respectively, solidity (KHĀRA), viscidity (ANEHA), heat (USNA) and motion (IRĀNA). Because of the presence of such specific properities in them, each is capable of special function also.

(c). Jainism.

Jain metaphysics ig realistic, since it admits the objectivity of the material world and the subject-object process of knowledge. When we reflect on our experience we can rudimentarily distinguish thr three basic aspects; substance (DRAVYA), which is an uncreated and industrucitible entity underlying all changes; the quality or attribute (GŪNA) which is the emmanent capacity for producing changes, but they are unchanging in themselves; changing modes (PARAYĀYAS) which are f further transformations of the atomic constitution of things in time and space.

Jain Metaphysics is a realistic and relativistic pluralism. The substance (DRAVYA) and the attribute (GŪNA) are inseparable. From this point of view of the changing modes reality is changing, momentary unreal. Since reality has infinite aspects, our judgments are necessarily conditioned, limited and relative to the individual. Reality is ma manyfold or pluralistics (anekāntayāda). If we donot accept this fact, we would make the same mstake as those five blind men who by touching respectively one and a different part of an elephant were arguing that their respective description was right.

(8). EVOLUTION OF SCIENTIFIC METHODOLOGY IN OCCIDENT.

The root of all western science are to be found in the first period of Greek Philosophy in the sixth century B.C. inaa culture where science,philosophy and religion were not separated.

The sages of Millesian scool in Ionia were concerned with the distinctions. Their aim was to discover the essential nature or r real constitution of yhings which they called 'PHYSIS'.* The term 'PHYSICS' was derived from the Greek word and meant therefore originally, the endeavour of the essential nature of things.

Thales, a great philosopher of that era, found cause of everything of the Universe is 'WATER'. This may seem a slight foundation of philosophic reputation; but this may be regarded as the attempt to find out the mysterious substance of the COSMOS'

To expose the mystical ideas of human being, mathematical l logical which is halfway between science and philosophy, had been developed. Thales went to Egypt and introduced study of geometry from there to Greec, Unlike the other contemporary scloars he was not only interested to know its practical application but as "an abstract" deductive science based on general propositions.

Anaximander (610-545)B.C.) introduced the idea of evolution ion into science, He attributed all changes to motion, there can be no coming into being or passing away.

THE PYTHAGOREAN SCHOOL.

Pythagores (born 530 B.C.) and his follower gave up the id

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* The term 'PHYSIS' is derived from the Greek word meant'AN attempt of seeing the essential nature of things.

idea of an single element and held matter to be composed of earth, water air and fire which were supposed to be divine by the combination in pairs of four underlying qualities hot and cold; wet and dry. Water for instance being cold and wet, while fire was hot and dry.

Pythagorians were the first to bring into prominence the abstract idea of NUMBER. They also studied numbers in a geometrical setting. The famous theorem of Pythagores usually attributed to them and generally to Pythagores. According to their theory the numbers lie at the basis of the real word.

PLATO (428 - 348 B.C.)

According to Plato God is good and the sphere is the most perfect forms, therefore the Universe must be spherical. He argued that stars as floating free in space, moved by their own souls. He considered the Sun moves round the earth, Plato's Physics and Biology were anthromorphic even ethecal.

ARISTOTLE (384 - 322 B.C.)

Aristotle, the follower of Platos, was the greatest collector and systemitecally established the knowledge of ancient time. His supreme importance is the history of science.

According to him there is an evermoving sphere of the outer heaven and the Unmoved Mover who must exists to keep it in motion. The book " On the soul " written by him was at the same time dealt with biology and psychology and according to this the plant kingdom was the souls and animal kingdom was the Absolute energy and absolute energy had manifested fully in men.

THE GROWTH OF EXPERIMENT IN ANCIENT GREECE.

In early period of Greek civilization the nature of the Universe had been depicted by purely intellect and without only appeal to facts. But some of Greeks become conscious of observing facts behind a function and some of them precisely studied the facts. Perhaps the first instance is to be found in an observation of Anaxmines (500 B.C.) that if we gently breath on the back of our hand, the breath feels war warm whereas if we blow violently, it feels cold. Though Anaxmines interpreted these facts wrongly, but we recognized the true experimental method of appealing to nature for information, and noting her answer.

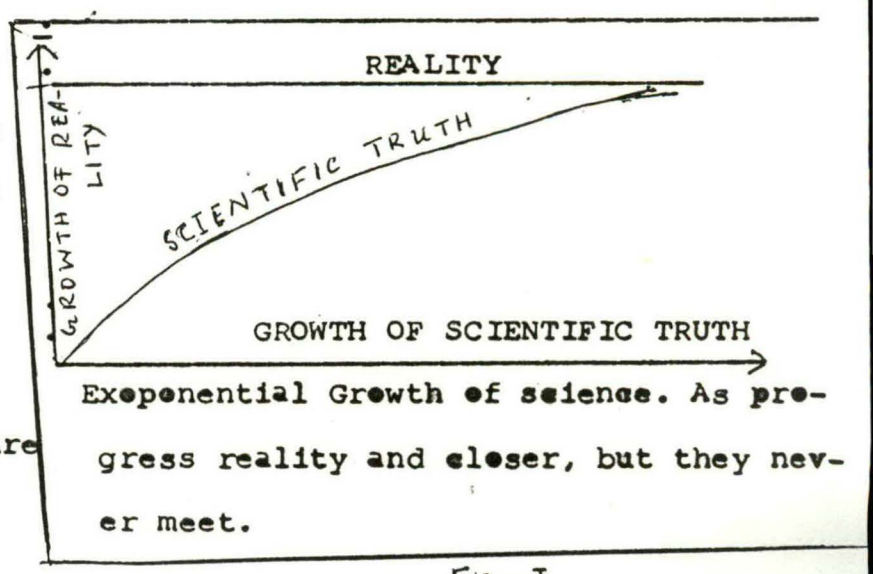
A few year later the Pythagorians were experimenting on the pitch of sounds. It must have been well-known that deep pitch sounds are produced by large structures and high-pitched sounds by small. Pythagorians is said to have followed this discovery by a series of experiments on string, and to have come upon certain laws which still form the basis of science of occustics. The great discoveries of the Pythagorians was that it is pleasent only if the lengths of the string stands in some quite numerical relation to one another such as two to one, three to two. We note them here as evidence of the increasing relaince on experiment.

Nearly a century later Empedocles investigated the nature of air by experiments.

(b) SCIENTIFIC METHODOLOGY.

Science at present sense, is a kind of systematized knowledge- a set of consistent concepts about how everything works. It is universal concepts about how every thing works. It is surprisingly simple, universal and objective. The more is the simpler will be its central concepts, and the wider its applicability.

We can think of two phases through which science progress PROPOSITION of new theories and ACCUMALATION of facts. The first one simplifies the situation while the second makes the field crowdy. Both of them swallow from the nature as much data as possible and digest them, degrade them into a mosiac. The mosiac acts as a model, a miniature UNIVERSE.



Exoponential Growth of science. As progress reality and closer, but they never meet.

Fig -I

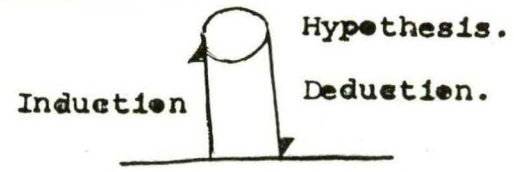
Science does not tell us what the NATURE really is. It only describe a model, a masked relitivity. As our understanding become clear and clear, the gap between the model and reality becomes smaller. But at the crucial point a gap remains - no matter howmuch progress we made. There is no absolute truth in science. Scientists are engaged to find out the nature's true nature and their patient endeavour for this give birth of new scientific truth which opens before them arena of st strange thoughts.They become astonished at the beauty and grandure of new scientific world thus discovered.

(e). Francis Bacon's methodology.

In the 16th. century the methodology suggested by Francis Bacon (1561 - 1626) was taken to be true.

According to him by recording all available facts, making all possible experiements and then collecting data and tabulating the resul ults by rules the connection between the phenomena would the results by rules the connection between the phenomena would become manifests general laws describing their relations emerge almost automatically.

But unfortunately the situation is not so simple. The method suggsted by Bacon found to be incorrect for scientific purpose: (i). It does not take into account the dynamic relationship between theory and experiments. (ii). It does noteexplain the role of intuition. (iii).It is based on a wrong co conception of inductionism. In fine, it may be said that Baconian hypothesis (and theory) is dull and over simplified[1].



Baconian System.

A hypothesis is discovered through Induction and justified through Deduction. These are only two opposite directions of the same road.

In Baconian time authentical facts were the urgent need of his days. He was the first to consider the philosophy of inductive science. In time the world of philosophic thought was becoming developed and was ripe for change. Francis Bacon devised what is roughly the ri right road to a wider and sounder knowledge.[2]

1. Science Reporter, C.S.I.R., 2nd. March, 1992, pp-99.
2. History of Science,4th. ed. Sir W.C.Dampeir, Cambridge University Press, 1948, pp-126.

NEW SCIENTIFIC METHODOLOGY

" There is no procedure for anticipating the future of Science, no ' Science of Science ' and there are even scientists who argue that it is impossible in principle to do so . . . . I find their arguments inconvincing ."

-- Gerald Feinberg.

Early methodologists of science were reductionists i.e. they believed in a completely logical structure of scientific process. Bacon, Newton, Jhon Stuart Mill, Aldous Huxely -- all of them denied the role of imagination. And that is the major problem with Baconian methodology. A completely new concept developes from the work of William Whewill and others. Later, Karl Popper discussed the concept in details called ' HYPOTHETICAL - DEDUCTING ' method. In this scheme imagination and criticism merge into each other to act in symbolic manner. A scientific theory starts from imagination endeavour. Hypothesis do not originate from the induction, but it is a kind of adventurous state of the romantic concept of that truth takes shape in our mind, we possess a frame inside our brain, a preconception of what might be true. Probability of making right and true conceptions is determined on a faculty of mind which may be called as ' INTUITION '. It varies from man to man and it had been found that man with higher intellectual development possess high degree of intuition.

After constructing a hypothesis (only after, not before) a scientist goes to criticize it by observation. The accuracy of observation depends upon the intuition of the observer who comes down

to some particulars from the general. He deduces theories, inferences and consequences. He predicts- If you take this being or that you wi ll observe such and such phenomena. This is how experiments in other modern sense enters.

One important aspect of hypothetico - deducting reasoning is that discoveries and justification evolved in two different path-ways. 1. . . . This allows us to provide a real varification. Through negative feed back we can constantantly rectify our hy hypothesis. Verabilty is scientific conception is our major factors.

A descripency between prediction and observation implies between the hypothesis is to be rejected. But an agreement betwe een these cannot be taken to mean that the hypothesis is quite correct. A particularly, right thing is wrong, but a particularly right thing is not necessarily right as a whole.

I N T U I T I O N.

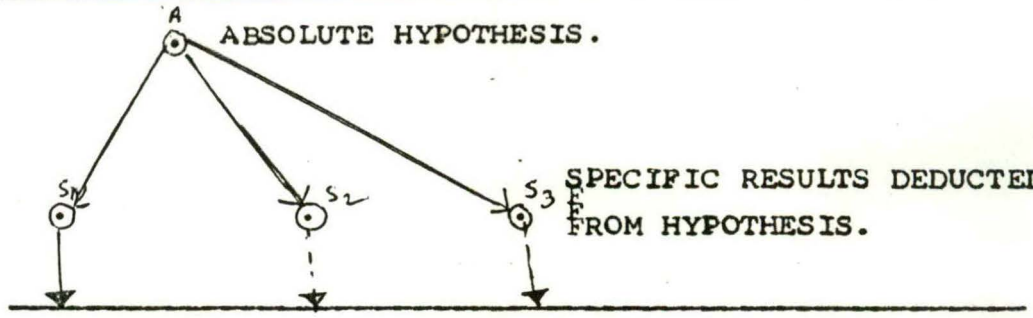
"Eureka, Eureka ....."

--Archermedes.

In the new methodology, intuition has a special place in s scientific discoyery, Intution arises suddenly without any conscious chain of reasons. It is always a creative act of mind. Great theories of science start with an exclamation -- 'Eureka, Eureka

We all know Kekule got the ideas of cyclic structure of b benzene, quantum theory of arrangement of electron around the nuclios containing proton and nutron reflected before minds eye of N. Bohr sitting in one of the park in Copenhegan.

Our brain is a very much complex science laboratory. Inside it we perform experiment with ideas, models and their consequences and alternatives. One of the greatest theory of relativity saw the li light of the day through intuition. In his Solovine Einstein explained ned the birth of the revolutionary theory with the help of a sketch(F



Einstien's sketch of HYPOTHETICO-DEDUCTIVE system. Here discovery and justification are two completely different roads.

Like any other idea, there are pitfall of the intuition. Blind faith in our perception and superistition may corrupt us. This was what happened to Kepler twice. For the first time, when he tried to explain the structure of the solar system using regular polygon.O Only a few years later he had to renew his idea of "COSMOS MYSTERY". for For the second time he went on to express the number of satellitesof the planets in terms of a mathematical series. Once again he had to retreat.

In the Indian philosophical literature intuition of the Seer-Scientists played a great roll in establishing the rational hypothesis and to formulate certain scientific laws.

THEORY AND EXPERIMENT

It is a dillema to the historians of science to determine which come first - theory or experiments ? However in hypothetic - deductive system. It is certainly the theory that comes first. Actually, it is hypothesis, the child-hood of theory, that comes first. This bring special advantages for experimental scientists. They are no longer to think that, " What would happen if . . . " Modern experimental scientists are being guided by some hypothesis in order to select apparatus which will lead them to expected results of the experiment. In fine, it may be expressed now-a-days the theory becomes blue print of experiment.

Now we come across a serious question, what relative importances one should give on theory and experiment ? There is no short cut answer rather it all depends upon the style and style varies from scientists to scientists. Newtown thought that a scientists should always be guided by experimental data; Einstein on the other hand emphasized on theory. Of course these two are rather extreme views. Generally the relation between theory and experiment is very dynamic and flexible. Science is progressing in a well defined self correcting way and that scientists follow some general guideline of methodology. This helps us to find out the mysteries of the UNIVERSE around us. For this an idea of possible model and adjusting it, remoulding it, pollishing it at every possible moment to bring us as close to the reality as possible.

Thus theory and experiments together are engaged for slow fading away over the face of grand poetry called the " COSMOS " and unfolding of the multiplied petals of the " COSMIC-LOTUS ".