SCIENCE IN JAINISM

Dr. M. R. Gelra

JAIN VISHVA BHARATI INSTITUTE
LADNUN

About the Book

Science in Jainsism : Perspectives, Issues and Futuristic Trends is both abstruse and empirical given the complexity of philosophy rooted in Jain doctrines. Philosophers and Scientists are constantly grappling with the problem of bridging the chasm between science and religion to unfold the hidden realities of the universe. This is indeed a Herculean task. To put thoughts into written words in a logical and convincing fashion with an accent on intellectual and moral persusion combined with rigours of research is perhaps a major challenge before us. On the eve of 26th Birth Centaury Celebrations of Lord Mahavira, the publication of this book shall unfold some of the issues on Jain Canonical Literature and Science.

SCIENCE IN JAINISM

PERSPECTIVES, ISSUES AND FUTURISTIC TRENDS

卐

DR. M.R. GELRA

Jain Vishva Bharati Institute
Ladnun - 341306

Publisher : Jain Vishva Bharati Institute, **Ladnun**

ISBN : 81-901458-1-9

Edition : 2002

Price : Rs. 200/-
$ 7.95

Printer : Sheetal Printer, Jaipur

BLESSINGS

The history of investigating truth is very old. Here 'truth' is being used in two senses:

1. Existence
2. Principle-universal principle

Both historical and pre-historical metaphysicians endeavoured to investigate truth and they did succeed in their aim. Their research was not laboratory-based. It had two main means:

1. Ingenuity of the senses
2. Trans-sensual knowledge.

The modern scientist is carrying out researches through laboratories equipped with

sophisticated instruments. It should cause no surprise that the laws being investigated by the scientists were investigated by the ancient metaphysicians too. The laws that the latter discovered are being discovered by the former also. Therefore metaphysics, philosophy and science should not be thought as altogether unrelated. They have some commonness too, that is why there is scope for making a comparative study of metaphysics, philosophy and science. Dr. Mahavir Raj Gelra has exploited this scope by making such a study. The present study is a very good example of the unity of the past and the present.

Jain canonical literature contains many universal laws. They have been scantily studied. A few scholars have made some efforts, in this direction, but they are not notable. Dr. Gelra's attempt to fill this void is truly commendable.

Acharya Mahapragya

Chhapar (Rajasthan)

FOREWORD

Science in Jainism: Perspectives, Issues and Futuristic Trends is both abstruse and empirical given the complexity of philosophy rooted in Jain doctrines. Philosophers and Scientists are constantly grappling with the problem of bridging the chasm between science and religion to unfold the hidden realities of the universe. This is indeed a Herculean task. To put thoughts into written words in a logical and convincing fashion with an accent on intellectual and moral persusion combined with rigours of research is perhaps a major challenge before us. The author of this volume Dr. Gelra has justified it beyond any shadow of doubt.

On the eve of 26th Birth Centenary celebrations of Lord Mahavira, I deem it befitting

to write a few words about the monumental work of Dr. M.R. Gelra who is Emeritus Professor, Jain Vishva Bharati Institute, (Deemed University), Ladnun in Rajasthan. I am struck by his solid scholarship while advancing various perspectives and futuristic trends in the science of Jainism. His deep insights into myriad strands of the Jain Philosophy with his scientific bent of mind will certainly generate productive and creative debate among scholars and intellectuals. This is not a small contribution to the further advancement of the knowledge in Jainism. Dr. Gelra, with his science background, has reinterpreted several dimensions of Jainism, which have not been flashed out so far in the existing literature. His chapter fifth entitled "The concept of eight point centre of universe in Jain Cosmology: a critique" is his a major contribution. Hopefully, it will open new avenues for researchers to reinvent or unfold the mysteries of the cosmological order within the parameters of Jain Mathematics. Also I am proud of Dr. Gelra's contribution to Anekantvad which he has examined in a holistic perspective, while offering innovative approach to deal with it in the fast changing social, cultural, political and psychological milieu.

I am hopeful Prof. Gelra will not stop his pen in mapping out the unchained field of Jain Philosophy.

Upadhaya Maniprabh Sagar

PREFACE

Mahavira's teachings on non violence are well known. There is a considerable number of books on Jain thought and culture. There are not many books available on Jainism and science and research in the field of science is advancing continually. Philosophical schools having relevant of scientific thought in their literature should review their concepts and doctrines in the light of modern science. During recent years some of the theoretical physicists have made a valuable contribution to the field of Cosmology. I was tempted to give shape to this book after reading 'A brief history of time' by Stephen Hawking. I felt that various concepts of the Jains can be understood now in a better and logical way in the scientific context.

I have tried to give readers different aspects of Jainism which may provide a critical perspective and a three fold relevance for present day scientific thought under the following heads:

1. The Philosophy of Nature.
2. The Philosophy of Science.
3. The Sociology of Science.

The chapters on 'Anekant' and 'Sellakhana' are representative of the philosophy and religion of the Jains. The chapters on the 'Eight point centre of Universe' and the "Universal space' are based on Jain Cosmology. The Jain Agamic literature is so vast and archaic that any final judgement on the concepts contained in it is difficult. The same is the case with modern science where new researches provide with new inferences. However, it is my sincere hope that this book will help the general reader to know about the relevance of science in Jainism .

I acknowledge my gratitude to Acharyashri Mahapragyaji, the fountain of Jain scholarship at the present period who has been kind enough to write a few words of blessing. I pay my respects to Upadhyaya Shri Maniprabhsagarji who has done me a favour by writing the foreword of this book, I am extremely grateful to professor R.P. Bhatnagar who has checked the language edited of the text and I shall fail in my duty if I do not acknowledge my wife Mrs. Gulab Gelra for the constant inspiration. For

inaccuracies or misinterpretation of any part of the text, the responsibility is fully mine.

I am sincerely thankful to the Vice-chancellor, Jain Vishva Bharati Institute, Ladnun for publishing this book.

Dr. M.R. Gelra
Professor Emeritus
Jain Vishva Bharati Institute
Ladnun

CONTENTS

1

SCIENCE IN JAINISM

Jainism is an ancient eastern religion. The cardinal principles of Jainism propounded by Lord Mahavira twenty-five centuries ago are based on reverence for life, equanimity and a sense of mutual interdependence. The Jain philosophy has enriched the freedom of human thought by its principle of Anekant i.e. Non-absolutism. The Jain culture has exercised profound influence on the lives of millions of people through their non-violent attitude, compassion and friendly behaviour to have peace in our material world.

It is significant to find that the Jain community is well known for the characteristic qualities of vegetarianism and of non- involvement in any area of violence, directly or indirectly. The Jain way of life is based on the great vows of Jain ethics i.e. non-injury, truthfulness, non-stealing, celibacy and non-hoarding of material substances. The Jains have kept the principle of non-violence alive for thirty centuries by their literature and the living institution of ascetics. The Jains have no political institution; they purely practice religion for individual emancipation or for the welfare of society. The Jains do neither criticise any other religion nor do they have any intention or programme of religious conversions. The meaning of the term Jain is, 'Conquerer' but to conquer one-self and not others. The quintessence of Jain scriptures may be viewed under three major ideological under-pinnings: religion, philosophy and science

1. Religion

One of the less realised but an important problem in the area of religion is the fact that there is no agreed definition of what religion is? Various definitions have been proposed over the centuries but as a matter of fact it is impossible to define religion without reference to religious activities.

Fundamentally, the Jain Religion emphasizes more on the practice of the conduct

based on non-violence and non-possession. Jains believe that the spiritual soul is eternal and characterised by consciousness. But the soul co-exists with physical matter i.e. Karma from the very beginning of time. The suffering in life is due to the karmic bondage to the soul. The ultimate goal of Jain religion is to liberate the soul from the karmic bondage by righteousness. The specialty of the Jain religion is that it has proposed a two-fold religion.

(i) Righteousness proper

(ii) Righteousness popular

The Jain ascetics, the nuns and monks who have renounced the world follow religion rigorously. They essentially and fully observe the five great vows and are known as Mahavratis. They observe severe penance and say prayers and do meditation to achieve 'Right knowledge, Right belief and Right conduct'. The religion practised only for the salvation of soul is known as righteousness proper. Chinese Pilgrim Hiuentsiang who visited India nearly two thousand years ago called Jain ascetics Li-hi (Nirgranthas). He wrote about Jain ascetics as follows "Jain ascetics distinguish themselves by leaving their bodies naked and pulling out their hair. Their skin is all cracked. Their feet are hard and chapped like rotting trees that are seen near rivers."

On the other hand Jain laymen who have to discharge moral duties related to the customs

and conventions of society may observe the five vows to a lesser degree. They are known as Anuvrati's. Different classes of people have different types of moral rules for their worldly duties. Jains have therefore called the moral duties as a righteousness popular to distinguish them from righteousness proper. A layman cannot escape from all types of violence while performing his social duties, however he can avoid any deliberate type of violence. Jains emphasize more on religious activities which are performed with a pure mind rather than the ritualistic part of religion.

2. Philosophy

Jain Philosophy is rooted in the doctrine of non-absolutism i.e. Anekant which implies that real truth is complex and may be explained and examined from divergent viewpoints. Each point of view gives a picture of the real which is true, but only partially true. Jains give respect to all aspects and views as equally true. Therefore, Jains exhibit tolerance to other faiths to the extent that even non-jains can liberate the soul from karma by practising righteousness proper. Any person irrespective of language religion or physical attributes can follow the path of righteousness proper to find peace and happiness and in doing so contribute to the well being of all life in the world.

The concepts of Einstein's theory of relativity and Heisenberg's theory of uncertainty are in tune with the Jain doctrine of Anekant. In reality non-absolutism strengths the freedom of thought of every individual. It presents a viewpoint of intellectual understanding and tolerance. Jain Ethics does not allow killing any other creature, deliberately. The Jains sacred duty is to generate compassion for other human beings. The principles of good conduct make the Jains ideal citizens in a troubled world. The Jains give a lot of emphasis to non-possession of things i.e. unwanted and unnecessary hoarding of things to avoid the rivalry between have-not's and have's.

The late Acharya Shri Tulsi propagated the Anuvrat movement, which discourages the aggressive and possessive urge in man. Basically the concept of Anuvrat implies the minimization of violence by way of inculcating right thought and practicing right action. An Anuvrati, therefore keeps control over these two unpardonable sins i.e. violent nature and hoarding nature.

3. Science

Most religions in this world have made efforts and taken interest in the creation of peace and happiness needed by us all. Jainism, however, affords a wonderful insight not only to its religion, philosophy and conduct but also to the Jain science presenting the mind of scientific genius of Jain scholars. The Jain contribution to

science seems to have leaped beyond Einstein's theory of relativity, beyond Plank's quantum mechanics and beyond big-bang theory in respect of the knowledge of very small and very large of the universe. It is interesting to find the concepts and properties and existence of various forms of Pudgal (matter) which are finer than atom, electron, gluon. photon, and graviton and larger than the size of big stars and Milky Way.

Jain scriptures have provided a classical knowledge not only of life and consciousness but also of the external world. The description of the cosmos, dimension of space, transition of soul during transmigration. existence of black holes, form, structure and dynamics of matter (Pudgala) are available in the scriptures. The elaborate description of the medium of motion, medium of rest, concept of space and time, and special reference of directions has put Jainism on a sound scientific footing. The Jain science developed specially to explain the material nature of karma because the soul cannot be liberated until the nature of karma is known.

It was certainly true in the past that what we call intelligence and scientific discovery give a survival advantage but it is not so clear now as the scientific discoveries may well lead us to complete destruction of the human kind. The modern age has become meeting point of Religion and Science. It is true that in the material, mechanical and the electromagnetic universe,

there is as yet no true transition to the fourth dimension of religion but it is a favorable sign that there is a shift in the thinking of the modern theoretical physicists from purely physical problems to the question of consciousness and morality. It reminds us of a great physicist of our time the lucasian Professor, S. Hawking who writes that the universe may be finite and with no boundaries, no edge in space, no beginning or end in time and therefore nothing for a creator to do. While reading the views of S.Hawking one feels that a Jain Master is giving his views on the universe.

It is true that out of all ancient Eastern Religions, it is only Jainism which believed that the universe is eternal, working by its inherent laws and not created by any God or supreme being. According to the Jain-philosophy, it is matter and soul, the two realities which are responsible for the existence of the universe. The time has come when religions should review and reexamine their theories in the light of modern science to revitalize themselves. On the other hand, a certain ethics and cultural atmosphere is essential to the proper functioning of science, for science has its own institutional and cultural preconditions. It will be proper if religions develop a proper image of science in its social and cultural contexts.

Jainism may provide a critical perspective and a three-fold relevance for the present day scientific thought.

(i) Philosophy of nature
(ii) Philosophy of science
(iii) Sociology of science

Philosophy of nature:

One area of relevance would be the philosophy of nature. Concepts of matter, of life and of mind developed in Jainism may suggest fruitful analogies and resemblances with scientific concepts and theories in these fields.

The present discoveries on the massless particles (e.g. Photon, graviton, gluon) are along the lines of the karmic particles as described in Jain literature. Upto Einstein period the popular concept was that the mass is matter and matter is mass, but the discovery of massless matter seems to be revolutionary. The Jains have plenty of literature describing the massless matter and how the massless matter converts itself into mass and vice-versa.

Once the concept of massless matter is fully established by scientists, the theories on life proposed by Jains will become worth comprehending since the soul and the massless karmic matter in Jain philosophy co-exist from the beginning of time. Besides the micro and macro forms of matter there is profound knowledge available on the space-time relationship, movement of massless matter and on the finite universe with infinite space.

Philosophy of science:

The second area of relevance is more at formal and methodological level of philosophy of science. The logical analysis and techniques of the Jain philosophical tradition i.e. Anekant may have important bearing that leads to the formal studies of the conceptual and methodological framework of science. Syadvad that have given significantly palpable logic's may be compared to the law of probability. It may have an important impact on natural sciences. A similar relevance for the conceptional foundations of the social science could be seen in Jain Action Theory. The concept of action has proved to be a foundational concept in the philosophy of social science and hence there is possibility of fruitful exploration :

Sociology of science:

Recent discussions about the sociology of science centre around a new image of science which we now term as a critical science, a third image, that contrasts with two earlier images of science viz., the Heroic image of science as the product of individual creativity and the Organisational image of science as a product of a technocratic order. As against these images of science we will have to develop a new perspective of critical science which would place science in its ecological context of human adaptation. This new perspective would require a re-thinking about the moral and cultural preconditions of scientific activity.

The idea of the ecology of science is firmly grounded into a moral perspective and the Jain moral tradition of the respect for life and its sanctity may have high potentials of relevance. Jains believe that immobile living beings earth water, fire, wind and plants have life (soul). It is stressed that souls influence each other and save each other, so global thinking is essential to save the earth from ecological disasters.

The Jain doctrine proposes that souls exit in organic dead masses in stones, in lumps of earth, in drops of water, the flame of fire and in wind and in vegetation. It maintains that these five kinds of immobile beings have a sense of touch and they experience any violence caused to them just as experienced by a human being. Therefore, Jain doctrine strongly advocates that people belonging to all nationalities must refrain from destroying them. Over the millennia, Jain philosophy has been invoking such a commitment as an integral part of society so that human beings do not tinker with the semblance of nature. The Jains have cultivated the practice to live non-violently with nature.

At this critical juncture it is very essential to integrate science with religion and vice-versa, so that the futile debate over they being diametrically opposed to each other may come to an end. And this will usher in a new era of material-moral upliftment of the entire mankind.

卐 卐 卐

2

ANEKANTA - A JAIN CONTRIBUTION TO SCHOLASTIC METHODOLOGY

Jain monastic learning and scholarship originated and developed from the need of transmitting and handing down to pupils the explanations of the sacred scriptures of Jainism. The teachings of Mahavira were first transmitted orally from one generation to another and later on they were reduced to writing in the Prakrit language in an archaic style which was popular

two thousand years ago. Jain Acharays with a view, to providing a scientific justification to the old inherited literature gave special emphasis on methodology and in doing so established a distinctive trait of Jain Scholasticism. They evolved quite a number of different systems of interpretative tools to explain the legitimacy of the traditions as mentioned in the canonical texts. Philosophically, the most scientific and efficacious part of the methodology is the theory of non-absolutism i.e. Anekantvad.

During the formative period of Anekantvad there were two prominent rival schools of thought in India. The Vedanta school posited reality i.e. the substance or dravya alone as the ultimate truth whereas the Buddhist phenomenalism accepted the modes of substance as the ultimate truth. The Jains appropriated them both and accepted, according to Jain Logic (Anekant) both substance and the various modes as the ultimate truth. This is how the doctrine of Anekant became the central thesis of Jain Philosophical thinking.

Anekantvad simply means viewing the Reality or Truth in its diverse aspects. It promotes a many sided approach to the problem of the knowledge of Reality. Each object of knowledge is found to be endowed with infinite attributes. Some of them appear to be mutually contradictory but they do coexist in the same object. This is the intrinsic nature of Reality. So the knowledge of

the true nature of every object should be viewed from different angles. Thinkers having a singular view in mind can see only one facet of Reality and cannot realise Reality in full.

Hermann Jacobi, the German Indologist has pointed out that Anekant opens the floodgates to the comprehension of Reality not only in toto but also in its different aspects. The principle of Anekant has been successfully applied to the mutual relationship between the body and soul. The Jains believe that substance is permanent but its modes are changeable. The soul is permanent but its mode, the body of a living being is changeable. The Jains again mention a dialogue which took place between Lord Mahavira and his first disciple Gautama. It was initiated at follows:

Gautama: "Is the soul permanent or impermanent, O Lord?"

Lord : The soul is permanent in some respect and impermanent in another respect.

It is permanent in respect of its substance, which is eternal the and it is impermanent in respect of the modes which originate and vanish.

Tattvaarth Sutra of Umaswati provides the definition of the Reality as follows :

'Utpaad-Vyaya-dhrauvya -yuktem- Sat i.e. origination, cessation and continuity exist in 'Sat'

i.e. Reality. The Jains describe substance as eternal but its modes as changeable. The examples are as follows :

(i) An earthern pot exists at one time as permanent as long as it is unbroken but when it breaks into pieces it becomes transitory. However, the sand or the clay of which the pot is made remains imperishable.

(ii) Gold ornaments can be changed from one form to another but the basic material gold does not perish.

Similarly man is immortal in relation to his soul but mortal in relation to the body. The conditioned mode of the existence of a substance and its attributes, at a particular time has been termed 'paryaya'. The concept of paryaya is foundational to Jain view of Reality and the most significant and singular contribution of the Jain school in the field of metaphysics is the distinctin between dravya and guna of the substance. There are infinite ways or modes in which reals can exist and this idea paves the way for the advocacy of Anekantavad.

Anekant unfolds its vision through Syadvad. There is an important relation between Anekantvad and Syadvad and they are closely interrelated. Anekant relates with the relative nature of infinite knowledge, Syadvad relates to

its verbal expression; which is always finite. Historically, it is assumed that Syadvad or the system of Saptabhangi is a later development in Jainism, and the doctrine of Anekantvad , the first and the most fundamental teaching of Mahavira, seems to precede Syadvad.

Syadvad is the synthetic method of knowledge and insists on making the statements conditionally keeping in mind a certain context. Since all human knowledge is relative, the judgemental and linguistic expression of it has also to contain the relations and conditions which characterize such a knowledge. This is the theory of Syadvad which has been further formalized in the form of Saptabhangi. The seven fold expressions are; Syad-asti, Syad-nasti, Syad-asti-nasti, Syad-avaktavya, Syad-asti-avaktavya, Syad-nastiavaktavya Syad-asti-nasti-avaktavya. (Asti means affirmation, nasti means negation, avaktavya means indescribable).

Looking to the criticism of the word 'Syat' in Syadvad or Saptabhangi in certain corners, Acharay Mahapragya has emphasized the use of the term 'eva' in the seven usual propositions (saptabhangi) for the popular example of pot which indicates the definite character of the assertion, or the negation or indescribability or their possible combinations. He further stresses the use of 'Syat' for the rest of the attributes other than existence in the pot. Achray Mahapragya has certainly given a new dimension in Jain logic to

prevent any controversy regarding the doctrine of Anekantvad.

We find that the concept of anekantvad, syadvad and saptabhangi are intimately related to each other and provide the foundation of Jain metaphysics, epistemology and logic respectively.

Anekant is supported by the independent system of Nayavada, seven possible modes of approach and description, one of which is singled out without regard to the others according to the need and purpose of the case. It implies that the real may be explained and examined from divergent viewpoints. These divergent view points present a comprehensive and synoptic picture of Reality. It is an analytical method. The Jains narrate a story about seven blind men and the elephant. All the blind men surrounded the elephant and touched its body. Somebody got the ear of the elephant, and others got the trunk or the tail or some other part of the body. The person who caught the leg of the elephant said that that elephant was like a pillar and he who caught the trunk said that the elephant was like a python and in this way every blind man asserted that his description alone was correct. The Jains say 'Only who can see the whole elephant can say the truth'.

Einstein's theory of Relativity and Heisenberg's theory of Uncertainty are in tune with the Jain doctrine of Anekant. A particular

mode appears only in a particular set of conditions with changed conditions there will be another mode of existence of that thing. So all our knowledge of a thing at particular spatio-temperal locus is conditional and relative to the circumstances. Of course, the possibility of absolute knowledge is all the while there. This is known as Nayavad.

In the beginning of the nineteenth century, French Scientist Laplace established the doctrine of scientific determinism on the lines of Newton Laws and argued that there should be a set of scientific laws that would predict everything that is happening in the universe including the human behaviour, if only we know the complete state of the universe at one time.

The advent of Law of Uncertainty in 1926 by Heisenberg, it signalled an end to Laplace's dream that the Universe could be completely deterministic, because one cannot measure the present state of the universe precisely! To measure the present state of position and velocity of a particle accurately, the obvious way is to shine light on the particle. The use of quantum light in any observation disturbs the particle and changes its velocity in a way that cannot be predicted. Moreover the more accurately one measures the position of the particle, the less accurately one can measures velocity and vice-versa. Stephen Hawking has pointed out that Uncertainty Principle is a fundamental, inescapable property of the world.

Anekant argues that the rational knowledge that occurs at the sensory level always requires some medium i.e. carrier of waves or energy. For example, if some object is to be seen by an eye, a ray of light i.e. quantum of energy is required. Other senses of the body also require the support of some waves for cognition of an object. It seems, therefore, that the cognition at the sensory level disturbs the position and condition of the object i.e. the object changes its paryaya. Hence it is correct to say that the same object does not exist in its present state when cognition occurs, because nobody can observe the present state of the universe without disturbing it. This uncertainty of cognition leads to Unpredictability. The Jains have, therefore, termed the sensory knowledge as indirect knowledge. The indirect knowledge, can be transmitted through a system of Saptabhangi which deals with Existence, Non-existence and unpredictability. While describing an event, the theory of sapatbhangi refers to terms of not only substance (dravya) but also refers to area (kshetra), time (kala) and attribute (bhavya).

The quantum mechanics has gone a step further to suggest that the uncertainty in the position and velocity of a particle should be viewed as a combination of both, that is to say that quantum mechanics does not predict a single definite result for an observation. Instead, it predicts a number of different possible outcomes and introduces a probability factor. Quantum

Mechanics has given similar treatment in case of the duality of waves and particles. Where there is dual nature, randomness or unpredictability occurs. The unpredictable, random element comes in only when we try to interpret the wave in terms of the positions and velocities of particles. This description of unpredictability in the field of physical science is very helpful in understanding the 'avaktaya' of saptabhangi.

The Jains have adopted two tier system of knowledge.

(i) Sensory i.e. indirect knowledge

(ii) Intuition i.e. direct or super sensory knowledge.

In case of direct knowledge, no carrier of energy is required for cognition. So the cognition occurs without disturbing the present state of the object. Such knowledge is pure and absolute. Whereas, in case of sensory knowledge, the use of carrier energy is required which disturbs the position of the object, hence it is known as indirect knowledge.

Besides Anekantvad, Nayavad and Syadvad, the general method of approaching a subject is further systematized in the form of the four Anuyogdvars, the tribhanga, the chaturbhang and the nikesap (name, sthapana, dravya and bhava). It is of special interest that these various

methodologies sometimes have nothing to do with the text to be explained but the inclusion of which in the teaching programme seemed essential or desirable to make the instruction richer and more rewarding for, teachers and pupils. It is therefore said that the Jain Acharyas were the best teachers, they could apply various methods and techniques in explaining the contents of the scriptures to the pupils.

These methods have helped in understanding the difficult and imperfectly explored texts with their old commentaries, the churnis and the Niryukti's. Prof. ALSDORF, has said 'there is no exaggeration if it is said that most of the original Jain contributions to Indian scholarship were made in the field of methodology'. Dr. A.N. Upadhyaya said 'the approach to reality adopted by Anekantvad strikes an original note in the history of Indian logic'. At the same time except the Anekant and Syadvad, the rest of the methodologies apparently reached their possible limits of its development and gradually fell into disuse.

The beginning of the Jain Philosophy can be traced to its oldest canonical text the Acharang Agam. From the very first sentences of the Acharang, it is clear that the migration of soul is accepted and it is mentioned that one who accepts this migration of soul is Atmavadi, Lokvadi, Karmavadi and Kriyavadi. It shows that

Jain philosophy starts with its fundamental principle of soul and its transmigration in space (Loka) due to the activity (kriya) of karma. The ultimate goal of Jainism is to liberate the soul from karmic bondage.

Jain philosophy proposes the theory of kriyavad, making it clear that Jains are not Nastikvadi. Jain philosophy according to the Acharang Sutra, conceives two real entities in this Loka (universe), the living beings (soul or chitta) and the matter (non soul or achitta).These two entities do not transform mutually though they exist together in the universe. The limitation of this concept is that the soul and karma coexist from the very beginning of time in this universe (loka) and the spiritual soul and material karma are eternal.

It is interesting to correlate this limitation of the Jain concept about universe and time with the modern theoretical physics. We are reminded of "Einstein's famous question about whether God had any choice in creating the universe?" The renowned physicist's Hawking speaks of 'A universe with no edge in space, no beginning or end in time, and nothing for a creator to do–

A saint philosopher of the twentyfirst century Acharya Mahapragya has observed the duality of apparently contrary attributes in substance and found that they enjoy mutual concomitance. Some of them are as follows :

(i) Universal and particular

(ii) Permanent and impermanent

(iii) Existence and non-existence

(iv) Speakable and unspeakable

(v) Being and non-being

These axioms of Anekantvad help us in understanding the philosophy of Jainism. With an extraordinary thoroughness and remarkable ingenuity the Jain acharyas have laid the foundation of their philosophy by adopting scholastic methodologies.

卐 卐 卐

3

LIVING IN HARMONY WITH NATURE - THE JAIN PERSPECTIVE

The United Nations Conference on Human Environment at Stockholm in 1972 declared:

"A point has been reached in history when we must shape our actions throughout the world with a more prudent care for their environmental consequences. Through ignorance or indifference

we can do massive and irreversible harm to the earthly environment on which our life and well being depend. Conversely, through fuller knowledge and wiser action. we can achieve for ourselves and our posterity a better life in an environment more in keeping with human needs and hopes. There are broad vistas for the enhancement of environmental quality and the creation of a good life. What is needed is an enthusiastic but calm state of mind and intense but orderly work. For the purpose of attaining freedom in the world of nature, man must use knowledge to build in collaboration with nature, a better environment. To defend and improve the human environment for present and future generations has become an imperative goal for mankind - a goal to be pursued together with, and in harmony with, the established and fundamental goals of peace and of worldwide economic and social development."

It spelt out three major components: -

(i) To attain the placidity and tranquility of mind.

(ii) To use knowledge in absolute union and harmony with nature.

(iii) To attain the fundamental goal of peace.

Subsequently. the 1992 Rio-de. Janeiro declaration on Environment and development provided a further impetus to reorient and reorder the problems and priorities with a view to

resolving this global problem confronting the entire human kind irrespective of geographical, national, racial. ethnic and regional frontiers. It stressed the integral and interdependent nature of the earth, "our home". More significantly. it reiterated its commitment to preserve, protect and restore the earth's ecosystem - the 'Earth Charter' envisioned the creation of a peaceful, plentiful and sustainable future for the entire mankind.

The continuously organised International Conferences on peace and non-violent action are a milestone in breaking new 'grounds by highlighting the significance of adopting a simple life style which is basically rooted into the doctrines of Ahimsa. ICPNA in India has started a three-dimensional programme i.e. Anuvrat Movement (a global ethic for social excellence) Preksha Meditation (perceptive meditation) and Jivan Vigyan (science of living) for moral enlightenment and spiritual upliftment. This programme launched by His Holiness Ganadhipati Tulsiji and the great Acharaya Mahapragyaji is fundamentally a derivative of the Jain Philosophy propounded scientifically over 2000 years ago by Lord Mahavira. As a matter of fact, Jain Philosophy advanced systematic and integral thought regarding the preservation and protection of Environment. Environment includes water, air, land, fire, vegetation and it establishes the ineluctable interrelationship within them, and simultaneously it strikes a harmonious balance with all typologies of living creatures.

Man has been interested in his environment right from his inception. The Greek thinker. Hippocrates published a paper on 'Air, water and plants '. Aristotle in his writings on natural history has refered to habits of animals and environmental conditions prevailing in certain areas. Theophrastus has written about plant communities and types of plants found in different areas.

The oldest Jain Prakrit texts state that souls (life) exist not only in organic structures of human bodies and animals but also in dead masses in stones, in lumps of earth, in drops of water, in the flames of fire and in the wind and vegetation. They maintain that these five kinds of immobile beings have a sense of touch i.e. a sense of feeling and they experience any violence caused to them just as it is experienced by a human being. Therefore, Jain doctrines categorical imperative is that all peoples belonging to all nationalities must refrain from destroying them.

These five one-sensed beings occur both in subtle (suhuma) and gross (bayara) forms. In their subtle form, they are undifferentiated within their kinds all over the universe. The Sushma plant-souls are infinite in number. They alone stay infinitely for a long time in the same form of existence.. According to modern science, scattered light and gravitational forces exist in every part of the universe. Similarly Jain canons explain the existence of Sushma animate souls

spreading over the entire cosmic universe. However, Jain canons do not purvey any detailed information pertaining to ways and means through which the subtle animate souls can fill up the entire universe. Probably it is a pre-canonical conception.

Achranga Pannavana and Thanang, Jain Agams have discussed these subtle animate one-sensed beings in detail in different contexts. These five immobile, one sensed being has their owned individual bodies, viz. earth-bodied, water-bodied, fire-bodied and so on. Vanaspati le plant-life exists in two forms. Firstly, it has one soul in one body. And secondly, it can possess a common body for a number of living souls. The latter type of vanaspati has a common medium of inspiration and respiration assimilation of food and the like. This concept is unique in Jain scriptures but it has not been mentioned anywhere else in other canonical literature. It is quite interesting to note that these old concepts of the Jain doctrine are reinforced by modern scientific experiments.

Any area of nature where living substances interacts to produce an exchange of materials between the living and non-living components are an ecological system or ecosystem (Transley 1935). It includes organisms (biotic) and non-living (abiotic) environment each influencing the properties of the other and both are necessary for the maintenance of life.

MIND ALIVE has established that living things not only feed and grow, but they also reproduce almost exact copies of themselves. To do this, they must pass on information which can be used to direct the building of the copies. This is the process of genetical inheritance, the information being contained and passed on in a genetic code, the copies being built from materials in the environment that are absorbed and reformed into the materials of the living body. This part of explanation finds a striking similarity and convergence with the, Jain Agam Acharang which substantiating that:

"As the nature of the man is to be born and to grow old, so is the nature of plant is to be born and to grow old; as man falls sick when cut, so plant falls sick when cut; as man needs food so plant needs food; as man will decay; so the plant decay; as man is changing, so plant is changing."

The pattern of similarity in the behaviour of man and plant establishes the presence of soul in plants too. The Jain Agams have also advanced the same cogent arguments to prove the presence of soul in earth, water, wind and fire. The rationale behind the argumentation is to prove that the one - sensed living beings experience pain and pleasure as men do. Concomitantly, man should not cause neither harm to them nor should he disturb the equilibrium existing amongst them.

However, the unprecedented pace of development in the field of science and technology has witnessed a mind-boggling progress in the industrial world. Such a rapid advancement or urbanisation and industrialization has ultimately resulted in myriad environmental pollution problems of horrendous nature.

To preserve, protect and sustain the environment from pollutant agents, a resurgence in human values is of categorical need today. The underlying significance of Jain doctrines, principles and ideals lies in the fact that it offers holistic perspective on how to bring a fundamental transformation in the perception and approaches of the inhabitants of this earth to coexist with environment by remaining sensitive as well friendly to it rather than inviting disaster for themselves. A non-violent society, a simple life style culture is fully capable of providing broad contours of devising both pragmatic and scientific solutions for the same.

The Acharang Sutra sounds an alarming note about the inescapable fatal consequences of destroying the environment. Its very essence is epitomised as under:

1. एस खलु गंधे
2. एस खलु मोहे
3. एस खलु मारे
4. एस खलु णरये

Impliedly, the destruction of environment is an act of dastardly violence, paranoia and abominable attachment leading ultimately to the death and dark hell.

卐 卐 卐

4

MASSLESS MATTER

There are many aspects of existence which Jain philosophers have described and explained ahead of the researches of modern science. One of them is the concept of 'Massless Matter'. Ancient Greek and Vedic philosophers believed that all matter in the Universe was made up of four basic elements, earth, air, fire and water. Aristotle argued that these elements were acted on by two forces: gravity and levity. The tendency of the earth and water to sink is due to gravity and the elements air and fire rise due to levity.

Jain philosophers were the first one, who believed that all the material existence can be divided into two categories: one carrying the mass (Gross matter) and the other carrying no mass (fine matter). This classification of matter is original and is based on the Jain Theory of the soul. The doctrine of soul is the central core of Jain Religion and philosophy. They maintain that all the souls of worldly beings are eternal and possess a cloud of Karma i.e. the bondage of fine massless karmic matter. Once the karmic matter is removed or annihilated and the influx of new karma is stopped, the worldly soul transforms into a pure, liberated soul.

The doctrine of soul has opened a gate to the studies on karmic matter under the name of 'Theory of Karma', which is very popular in Jain philosophy. It deals with the properties, behaviour, position, velocity etc. of the massless karmic matter. Probably, the Jain thinkers have done the earliest theoretical attempt on the studies on 'Massless matter'. It is remarkable that this division of the contents of the universe in two forms i.e. the gross and fine matter is still used today under the name of matter and force.

Upto the beginning of the twentieth century, Einstein firmly believed that the 'Mass is matter and matter is mass'. Hence, it was not proper on the part of the Jain philosophers to argue that matter and force carrying particles are synonymous with their philosophical terms of

gross pudgala (massive) and the fine pudgala (massless) respectively. Now, we find that during the researches in particle physics in the sixties of 20th century, force-carrying particles like photon, graviton and gluon have been considered to be nearly massless. In this context, it is, interesting to study the concept of massless pudgala described in Jain philosophy, which is nearly two thousand years old philosophy.

The concept of massless matter in Jain literature has been elaborately discussed under the name of sukshma pudgala. Pudgala dravya is a synonym of the term matter. Pudgala is one of the six fundamental dravyas (Substances) which constitute the universe. Dravya means Satta, (existence).

The Jains hold that dravya exists in its own nature and has its own attributes and modifications. Pudgala has been distinguished from the rest of the five dravyas by its possession of touch, taste, smell and colour. These are the primary (eternal) attributes of pudgala. In addition to these essential attributes pudgala has certain samsthan i.e. form or figure of its own. Being a dravya these attributes are inseparable with it and are also in constant change of state. This ever-changing and renewing quality of pudgala is termed as paryaya, which involves both combination and dissociation. The change in magnitude and intensity in various essential attributes of pudgala causes the evolution of

certain secondary qualities such as sound, cohesion, dimension, figure, divisibility, opacity, mass, radiant heat, light etc. All these attributes are derivatives and do not claim as essential attributes.

The distinguishing attributes have been further classified. Pudgala may have four or eight varieties of tactility, two tastes, two smells and five colours. The study of all these attributes is not directly related to the masslessness of pudgala and therefore reflections have been confined to tactility only. Out of eight forms of tactility (cold, hot, oily, dry, soft, coarse, light & heavy) discussion has been centered on two forms only, which are responsible for the evolution of mass. These forms are oily and dry.

It will be helpful to study the other classification of pudgala discussed in Jain literature. Pudgala exists in two forms.

(i) Parmanu (ii) Skandh

Parmanu is the smallest part of the pudgala but it is different from the term atom. Bhagwati Sutra describes at various levels the diverse attributes of parmanu, regarding tactility, each parmanu has two kinds of tactility. It will be either cold or hot and oily or dry. By permutation and combination four types of parmanus are possible. Parmanu may be cold and oily (snigdha) or cold and dry (ruksha) or hot and snigdha or

hot and ruksha. It shows that these are four original kinds of tactility of pudgala.

Skandha (molecule) is an individual aggregate formed by the combination of parmanus. Two parmanus may combine and form dvipradeshi skandh. Pradesh means a parmanu in union with the skandh. More parmanus or skandh may combine to form countable, uncountable or infinite pradeshi skandhs.

The most remarkable contribution of the Jains to the atomic theory relates to their analysis of atomic linking or the mutual attraction or repulsion of parmanus to form skandhs (molecules). Such combinations bring about new qualities in Skandh. Mass is one of them. Mass is not the fundamental property of the parmanu. The two traditions of Jains, Swetamber and Digamber hold different view regarding the laws of combination.

Skandh may form in two ways:

(i) Sadrashya parmanus i.e. parmanus of similar tactility.

(ii) Visadrashya parmanus i.e. parmanus of opposite tactility. (Snigdha parmanus combining with ruksha parmanus).

Swetamber tradition holds that:

(i) In sadrashya parmanu combination first there should be a minimum difference of

two-unit intensity and secondly either of the, parmanus should not be of one unit intensity only i.e. of jaghanya guna (minimum degree of attribute).

(ii) In Visadrashya parmanu combination it is not necessary that there should be a minimum difference of two-unit intensity as required in sadrashya parmanu combination. Further, both the parmanus should not be of one unit intensity only i.e. of Jaghanya guna. In the rest of the cases, combination does take place. Digamber tradition holds the view that the combinations in sadrashya and visadrashya parmanus follow the same rule. The combination can take place only when there is a minimum difference of two-unit intensity. Otherwise no combination can take place.

According to the Jains, parmanus combining to form skandh (molecule) may exist mainly in two forms: sthula (gross) and sukshma (fine).

The discussion of the sukshma pudgala is interesting and illuminating. It is of two types.

(i) Chatusfarshi pudgala i.e. with four attributes of tactility.

(ii) Asthfarshi pudgala i.e. with eight attributes of tactility.

Chatusfarshi pudgalas have cold, hot, oily and dry tactility. These pudgalas have no mass. The large increase in oily tactility during combination causes the evolution of mass. The large increase in dry tactility makes the pudgala lighter. The other tactilities are responsible for the evolution of other properties of the molecule. The large increase in cold and oily tactility brings about softness in the pudgalas whereas increase in hot and dry tactility brings about hardness in the molecule.

According to the Jains, the massless pudgala moves with tremendous velocity without gaining any mass. The parmanu can move from one end of the universe to the other in a unit fraction of time. It means that the Jain concept regarding the velocity of pudgala parmanu is much greater than the velocity of light. Recently an Indian scientist Prof Sudersen has discussed about the particle which moves with the velocity greater than the velocity of light. It is against the Einstein equation. The difficulty with the modern scientist is that they have categorized the material particles on the basis of proper mass and velocity whereas Jainology discusses massless fine pudgala on the basis of oily and dry tactility. It is interesting to quote the heading which has appeared in press 'What's faster than the speed of light! Light. The details are as follows :

"Scientists has apparently broken the universe's speed limit. For generations, physicists believed there is nothing faster than light moving

through a vacuum - a speed of 300,000 Km per second.

But in an experiment in Princeton, New Jersey, physicists sent a pulse of laser light through cesium vapour so quickly that it left the chamber before it had even finished entering.

The pulse travelled 310 times the distance it would have covered if the chamber had contained a vacuum.

Researchers say it is the most convincing demonstration yet that the speed of light - supposedly an ironclad rule of nature - can be pushed beyond known boundaries, at least under laboratory circumstances.

"This effect cannot be used to send information back in time," said Mr. Wang Lijun, a researcher with the private NEC Institute.

"However, our experiment does show that the generally-held conception that 'nothing can travel faster than the speed of light' is wrong."

The results of the work by Mr. Wang, Mr. Alexander Kuzmich and Mr. Arthur Dogariu were published in the journal, Nature.

The achievement has no practical application right now, but such experiments have generated much excitement in the international community of theoretical and optical physicists.

Said Mr. Raymond Chiao, a physicist at the University of California in Berkeley who was not involved in the work: "This is a break-through in the sense that people have thought that was impossible."

Massless pudgalas which are useful for living beings include the waves of swasoswas vargana (breathing), bhasha vargana (speech) mano vargana (mind) and karmic matter attached to the soul. Vargana means the waves and its vibrations with a particular wavelength. The instrumental science is trying to exercise control over these varganas, but it is extremely difficult.

Massless pudgala is densely packed in the entire space.

The relationship of space and matter was not well understood in the field of science until the idea of energy fully developed. Nobel Laureate Erwin Schrodinger in the article 'What is matter' mentioned that the gravitational forces, scattered and diffracted light, are reaching the far end of the universe from the remote starts situated at the distant places. No space is left vacant. Jainology adds to it by accepting that the particles finer than photons exist which are massless and may move with a greater velocity than the velocity of light. They are fully packed in the entire space but do not obstruct the movement of other pudgalas.

If we trace the history and development of the theory of Atom, in the field of physical

sciences, we find that the beginning of twentieth century, was tremendously significant because of the discovery of electron, proton and later on of neutron. Scientists were very much hopeful that they were very near to, a knowledge of the ultimate building blocks of nature. But the continuing researches during the middle of 20th century, could discover a number of other fundamental particles.. It hampered the advancement of science in the field of particle physics. Scientists came to know that the nature is not so simple.

However, in the sixties of 20th century experiments were conducted in which protons were collided with other protons or electrons at high speeds, which indicated that they are in fact made up of smaller particles. These experiments showed that there are only three fundamental families of matter known as Electron family, Muon family and Tau family whose particles are named as 'up' Quark, the 'down' quark and the electron. It is believed that these quark particles originated right from the period of big bang of the universe and are fundamental particles. The particle physicists established that the universe around us consists of six fundamental 'Flavors; i.e. up, down, strange, charmed, bottom and top. These recent experiments carried out at CERN and SLAC on quarks have thrown light on the behavior of the particles carrying forces which are massless.

Stephen Hawking in his book 'A brief history of the time' has described four categories

of the forces carrying particles. They are gravitational force, electromagnetic force, weak nuclear force and Strong nuclear force. Except the weak nuclear force, rests of the three forces carry the particles of graviton, photon and gluon respectively. These particles do not obey the exclusion principle i.e. there is no limit to the number that can be exchanged and so they can give rise to a strong force.

The force carrying particles exchanged between matter particles are said to be virtual particles, because unlike 'real' particles, a particle detector cannot directly detect them. Even then they exist, because they do have a measurable effect: they give rise to forces between matter particles. These particles also exist in some circumstances as real particles, when they can be directly detected. These particles appear in the form of waves such as waves of light or gravitational waves. The behaviour of gluon particle is very unique and appears sometimes as metaphysical. However, experiments suggest that gluon, a massless particle must have been present right from the time of formation of quarks after big bang.

The outcome of these scientific studies is likely to lead us a long way in understanding the behaviour of Karmic particles which are massless and which control the actions of the soul i.e. self. It is evident from the above discussion that Jain philosophy's contribution in the field of material science is quite unique.

卐 卐 卐

5

CONCEPT OF THE EIGHT POINT CENTRE IN JAIN COSMOLOGY : A CRITIQUE

In India Mathematics has been a subject of the study since 1000 B.C. During the Vedic period, altars of specified shape and area were constructed for the sacrificial fire. They employed methods that could provide desired geometrical figures like triangles, rectangles, semi-circles, trapezia, rectangles with a semi-circle on one

side. During the initial period the magnitudes of these figures were represented by segments.

The genesis of the Jain Mathematics in India may be traced as back as 300 B.C. to 500 B.C. It is a truism that during this period Jainism expanded in India. Jain mathematicians were not interested in the shape of altars, they turned their attention to and initiated studies focussing primarily on Cosmology and Cosmography. Secondly the studies were devoted to the behaviour of massless pudgal (like gluon particles) with a view to enriching the concepts on epistemology and philosophy. The Jain mathematicians employed simple and popular house-hold things while constructing the figures of various systems discussed in Jain ancient scriptures. Their major contribution in Cosmology hinged on building a model of the universe. Also they formulated a new scientific paradigm of the eight-point centre of the universe. The illustrations pertaining to the shape of the universe and an eight-point centre are as follows:

(I) UNIVERSE (COSMOS)

(a) Three bowls were used. One bowl placed convex-wise (i.e. upside down) at the bottom, the second bowl placed concave-wise (i.e. with the face upward) above it and the third one placed convex-wise (like the bowl at the bottom) upon the second one.

The resultant configuration arising from the conjuction of three conical bowls with the shape of chopped of pyramids on four sides becomes the model comparable with the figure of cosmos. (fig.1) This figure if seen in its vertical cross-section narrows from below to the centre and then widens again in nearly the same degree as above. This model shows that both the summit and base are built in a convex shape.

(b) Similarly, efforts were made to construct a model of the universe with the aid of other house-hold things.

(c) It is also mentioned that the cosmos is shaped like a human standing with legs apart, palms resting on his waist and therefore known 'Cosmic person'.

(d) Kirfel, the German scholar interpreted the figure of the universe as "three pyramids one upon the other, each having a square base and rising in steps on all sides, the centre one of which standing on its top surface'.

(II) EIGHT-POINT CENTRE (EPC)

(a) The EPC may be compared to the figure that emerges when the four udders of a cow are in one plane and four udders of an another cow are in a lower plane, interlinking in

such a way that each point gets enjoined to other two points. This is probably three dimensional figure that of a cube (fig. 2,3). EPC exists at the half way of vertical dimension of the universe.

(b) It is emphasized that from the corner points of eight-point centre (EPC) figure, four main directions (East, West, North and South), four intermediate directions and two zenith (upper) and nadir (lower) directions originate. (Figure 4, 5)

(c) E. Schubring the German Indologist highly appreciated the Jain mathematicians remarkable mode of developing a eight point centre which forms geometrically a figure of three dimensional cube.

This cubical unit is quite significant since all directions originate from the central cubical unit by elongation of point-paesa (region) gradually. The origination of these directions is independently of the sun.

We may observe that the Jains have illustrated the shape of the universe with the help of three bowls including the shape of the eight-point centre which is compared to the udders of the cow. It reveals a notable degree of correct observation in the field of geometry and wonderful insights into the natural world. Jain mathematicians contributed tremendously to the

growth of geometry in the early stage of the Vedic period.

Cosmology is a modern and advanced subject and during this century various models of cosmology have been formulated by scientists (static, steady-state, evolutionary) under various assumptions. Scientists could find the mass density and the total-mass content, the age, the phase of its present dynamical behaviour and its chemical evolution with time, for formulating a comprehensive theory on cosmology. It is, however, important to note that the modern cosmologists have not proposed any centre or centres of universe.

The subject of modern cosmology has been a meeting place of contradictory (or at least alternative) theories and observations. The present observational status does not let any cosmological model to be either, wholly accepted or totally rejected. Hence none of the models can be singled out as an ideal one. Even the most powerful optical and radio telescopes available at present are unable to fathom the whole depth of the universe and whatever observations are obtained at large distances, their correct interpretations have quite often eluded the scientists.

It has thrilled the traditional cosmologists particularly Jain cosmologists on account of identical and closer interpretations which appear

to be quite rational and scientific. We consider cosmology as a truly modern subject but at the same time it has ancient roots. It would therefore, be a worthwhile exercise to investigate the issues in Jain cosmology which are either in tune with or may provide suggestive leads to the modern cosmology.

Hence, our studies are not to discuss the physical or the metaphysical part of the cosmos but to observe the growth of geometry with a special reference to the significance of the eight-point-centre of the universe. This issue becomes all the more important because modern cosmologists have virtually ignored the centre or the centres of the universe.

Some of the basic facts about the Universe and its centre may be discussed in the light of the following essential parameters. viz.,

(i) Mass (ii) Space
(iii) Time (iv) Geometry

MASS

According to the Jain Philosophy Pudgal i.e. matter exists in two forms;

(i) Matter possessing mass

(ii) Massless matter

The unique concept of massless matter has been elaborately analysed in Jain literature. The

massless matter is so subtle that it is unobservable even by the meticulous scientific instruments so far as known to us. The massless matter is fully filled or rather packed in the universe. There is an interchangeability relationship between mass form and massless form. Hence the mass content at a particular point at any moment does not remain the same in the universe. However, the sum total of the different forms of Pudgal- matter remains unaltered within the confines of the universe. The interchange taking place within two forms of matter as mentioned above may be represented as under:

MASSLESS MATTER $\rightleftharpoons$ MASS MATTER

The shift of equilibrium on either side will change the mass density. Therefore, the Jains have not recognised the mass as a fundamental property of the reality of the universe. There is great support of modern science to the Jain cosmologist regarding the existence of the massless matter. The'quark-soup' that constituted the universe at the early times on the cosmic clock is an ultimate testing ground for the theories of particle physics.

The discovery of massless particles, viz. gluons with different form of quarks has given sanction to the Jain observations on massless matter. Therefore, the future researches in particle physics, particularly the gluons and quarks would help in understanding the true nature of massless

matter. It is highly commendable that the Jains have observed the massless matter in nature two thousand year ago. Their observations on massless matter may give suggestive lead to modern cosmology.

Modern cosmologists have observed and confirmed the peculiar feature in galaxies that new galaxies are forming i.e. new matter is in the process of creation. Such observations have lent support to the continuous creation hypothesis. But this goes against the law of conservation of mass and conservation of energy. If this disputable issue is examined in the light of the Jain cosmology, it may be suggested that when an equilibrium shift takes place from massless form to mass form of matter, it is felt as if new matter has been created. However, the pudgal i.e. both the forms of matter their total plus remains the same. We have to keep our discussion restricted to theoretical assumptions because of the non-availability of its mathematical calculation. The old writings of Jain literature are in the Prakrit language and out of respect for the rules of grammar the calculation part seems to have been omitted.

SPACE

According to the Jains total space exists in two parts. The part in which animate and inanimate substances exist is known as cosmic space. The rest of the space that surrounds the

cosmic space in all directions is known as acosmic or supercosmic space. Acosmic space does not possess any kind of substance. Cosmic space is finite in relation to acosmic space which is infinite. Cosmology is the science which attempts to give answers regarding the understanding of the pheomenon behind the cosmos. No one had earlier conceived or observed the existence of void space behind the cosmos. The concept of acosmic space and its infinite dimension is original in Jain literature. Requirement for a body to be in static equilibrium is that the vector sum of all the external forces and external torques acting on the body if measured about any possible point must be zero.

Any decision regarding the static equilibrium of the whole universe, is difficult one. The role of acosmic space seems to be very important. Acosmic space surrounds the whole universe from all directions. The resultant effect will be that there will be no force, no torque no pressure and no entropy change etc. on the external boundary of the universe. Because acosmic space is completely a void space, the stability of the geometrical figure of the universe will depend entirely on its configuration and perhaps on its centre, which will be dealt with in the forthcoming section on geometry.

All evolving cosmological models are based on two basic postulates.

(i) Isotropy

(ii) Homogeneity

Isotropy means, "In whichever directions we may look, the law of red shifts remains the same. The red shift being a measure of the recessional speed of a galaxy. This leads to the conclusion that at least presently the universe is expanding. Homogeneity i.e. the distant part of the universe would not have been different from our local environment.

According to the Jains universal space is not expanding but the formulation of all the four directions creates the misconception of expanding Universe. It is interesting to know how the Jains have conceived the origin of directions. For this, EPC and its shape play an important role. EPC has a shape of a cube having eight corner point. Each main direction (North, South, East and West) originates with minimum of two central adjacent points (out of eight points) which gradually increases by plus one point-paesa on each side.

In fact the regular increase of point-paesa elongates the main direction in the space. It is the peculiarity of the direction that it virtually takes a drum-like shape, perhaps due to the curvature caused by the direction itself in the space. As the space is inert it does not have any shape. It seems that the formulation of the direction in the drum shape, looks as if there is a curvature in the

space. According to the Jains, space and direction are two different realities of the universe. It is significant to note that these directions extend upto the end of acosmic space. It is, therefore, logical to presume that the boundary of the universe should be a curved one. It is in conformity with modern ideas.

The Jains have pointed out the existence of four main directions, four intermediate directions and one upward and one downward direction. Descriptions of the intermediate directions and Zenith and Nadir (upward and downward) directions is different from that of the main directions. The intermediate directions originate from one point-paesa of the EPC and elongate diagonally upto the end of the universe. The specific observation is that there is not gradual increase of point-paesa. Similarly, the Zenith and Nadir directions originate from four point-paesa and elongate to the end of the universe. The intermediate, Zenith and nadir directions, do not gradually increase in point-paesa.

It is to be noted that the formulation of main directions is different from that of intermediate, upward and downward directions. It accords with the Jain postulate that the motion of matter takes place only in the realm of main directions. Hence the isotropy the matter is moving away and away is observed to be causing the expansion of the universe. Homogeneity is observed by the uniformity and inertness of space.

TIME

According to Jain cosmology, the universe is beginningless and endless with respect to time. We have noted that the universe is finite in relation to space but its time dimension is infinite in terms of both past and future.

It was stated earlier that there is a change in mass density with time due to the shift of equilibrium between mass and massless forms of matter. This shift of equilibrium with time will certainly shift the geometric centre of the universe.

Very recently STEPHEN HAWKING (A brief history of time, 1988) has proposed a finite universe with no boundaries without beginning of time. It is a new concept based on the combination of quantum mechanics and general relativity which holds good for Jain concept of space and time.

The Jains postulate six fundamental substances which constitute this universe.

(i) Medium of motion

(ii) Medium of rest

(iii) Space

(iv) Matter

(v) Soul

(vi) Time

Jain described that the shape of the medium of motion and the medium of rest is the shape of the universe. The universe is completely self-contained and self described. Hence the Jain universe may be regarded as being of a closed shape with no specific boundary of its own because the directions move out of the Loka (Cosmic Universe) to Aloka (acosmic universe).

GEOMETRY

Modern cosmology strongly suggests that the universe is expanding with the distant galaxies moving away from us at the rate given by Hubble's law. The expansion described by Hubble's Law and the presence of ubiquitous background microwave radiation suggest that the universe began in a "bigbang" about 15 billion years ago. It has been assumed that when the universe was only 300,000 years old which was about 15×10^9 years ago, it should have condensed to an oval shape. The Jain view of the shape of the cosmos and its eight point centre has been projected earlier. The geometrical figures of the universe if seen in a vertical plane, may be compared with the arithmetical number (8) of nearly equal halves. The figure of number (8) appears like a combination of two ovals linked together. The two lobes of the universe, therefore, look like an oval shape.

Let us study the peculiar postulate of Jain cosmology i.e. 'Universe with eight point centre'.

Any rigid solid object can have only one point centre. If the universe were a rigid solid body, one could visualise only one centre. According to modern cosmology, in an infinite universe every point can be regarded as a centre because every point has an infinite number of stars on each side. Hence it is impossible to think of the centre of the universe with an unlimited dimension. As the universe has been given a definite geometrical shape by the Jains, one can locate a centre of that shape. We have to take the following important postulates of the Jain cosmology into consideration.

(i) The force or torque on the external boundary of the universe is zero, because ot the presence of void acosmic space.

(ii) There is a change in the mass-density with time in the two lobes of the universe due to shift in equilibrium between two forms of matter. i.e. mass to massless and vice-versa. Hence the centre of the universe cannot be static but changes its position.

(iii) The main directions (north, south, east and West) are drum shape and originate from a pair of EPC.

These postulates may lead us to locate the centre of the Universe.

(i) Because acosmic space is completely a void space, the stability of the geometrical figure

of the universe will depend entirely on its configuration and perhaps on its centre.

(ii) Because of the change in mass density with time in two lobes of the universe, the following possibilities arise.

(a) There is a possibility of the continuous variation of centre with time in some small region near the geometrical centre of the universe, which lies somewhere at the half way of the vertical dimension of the universe.

(b) The variation of the centre of the universe can be presumed to be along an oblate sphere (like pressed water-drop)

(c) The oblate sphere intersects the edges of the eight Ruyaga-Padesa which lie near the geometrical centre of the universe. These Ruyaga padesa are comparable to the udders of a cow.

(d) As per the Jains, these eight points get stabilized and when properly joined give a shape either of a cube or a cuboid or something shape.

(iii) The condition for the origination of direction is fulfilled by the shape of a cube, therefore it is logical to accept EPC in the form of a cube. The elongation of main

direction in the drum like shape i.e. curved shape in space makes it probable that some voids are left and as such this lacks continuity of direction. However, the idea of a moving centre has far reaching consequences. The directions are an automatic outcome with no gaps.

The sheer scale of the Jain vision of time, space, mass and geometry, a vision that includes the notion of infinity is a tribute to the sophistication and insight of these great mathematicians. In this vision the idea of time and space as co-existents was later identified by Einstein.

卐 卐 卐

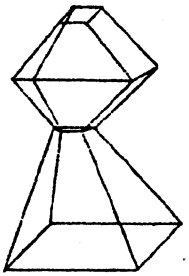

Fig. 1

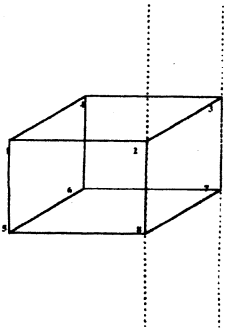

Fig. 2

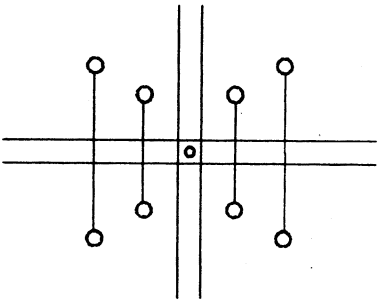

Fig. 3

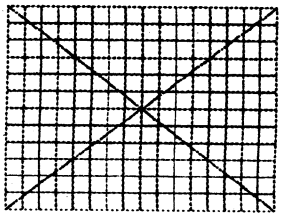

Fig. 4

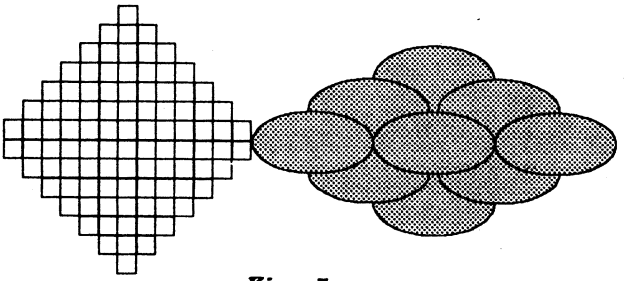

Fig. 5

6

SANTHARA-AN AUSPICIOUS DEATH

Most of the human cultures and religions do not permit and recommend the voluntary religious deaths whatsoever may be the circumstances severe in nature. Everybody loves to live and nobody wants to die, so taking the life of any living being including one's own is regarded as a great sin. Voluntary death is a suicide and has not been considered as a

religious act. Death is a natural process, the termination of physical life; however some of the spiritual Religions believe that death is a process of acquiring new embodiments and hence, it should be faced without fear. They believe that at death the soul leaves the physical body and migrates to new destiny. If the death occurs amidst auspicious thoughts and meditation, it is a holy death and it improves the qualities of soul.

It is interesting to find that in Jain Religion there is a tradition of a typical systematic fasting, which is known as Sallekhana and fasting which leads unto death is known as Santhara. This religious act known as Sallekhana-Santhara has remained very popular throughout the history of Jainism. It is mostly known for a voluntary vow fast-unto-death (Santhara) by gradually abstaining from food, water and every kind of nourishment to the body when one is approaching the end of life. It is therefore significant to know the concept of death in Jain Religion. How Jain religion and philosophy have distinguished Sallekhana and Santhara from the suicide?

Santhara

According to Jain scriptures, Santhara means to weaken the strength of body and passion for putting an end to the bodily existence without consciously coveting death by fasting. It is

undertaken when one is faced with an unavoidable natural calamity, severe drought, old age or an incurable disease. Prior to the adoption of the vow, one is required to give up all feelings of love, hatred, companionship and worldly attachments with a pure mind and obtain forgiveness of one's kinsmen and of others with all humanity at the same time forgiving them sincerely. It is also imperative that one should undertake the great vow of Santhara after discussing it thoroughly and frankly with one's guru (religious preceptor) and after confessing before him all the acts of sins either committed by oneself or committed with one's consent or at the instance of oneself.

Santhara and suicide

Santhara in a sense is a voluntary death but the Jains do not consider it as equivalent to committing suicide. The Jains distinguish between a fool's (bala) way of self killing and a wise man's (pandita) manner of liberation. He who kills himself by drowning or by means of fire, poison or lethal weapons being actuated and overpowered by strong passions is certainly guilty of suicide. This kind of suicide is unconditionally and strongly disapproved by Lord Mahavira. But a fast unto death for shaking off with abstinence the bondage of the material karmas is regarded as a wise man's (pandita) liberation. It is then not suicide.

Santhara and Ahimsa

For an ordinary person, this subtle distinction between suicide and Santhara is beyond his comprehension and significance. He is mortally afraid of the voluntary death and considers it dreadful and repugnant to all ethics. Even those religions that do not advocate the liberation of soul have misunderstood the concept of Santhara and objected to it on the grounds that Santhara is against the fundamental principle of ahimsa. Mrs. Sinclair in her book (Heart of Jainism pp 163-65) has remarked "It is strange that a religious system which begins with the most minute regulations against the taking of the life of the lowest insect should end by encouraging human suicide". We find similar comments in the Encyclopaedia of Religion and Ethics by Hastings, p.347.

It is, therefore, interesting to study santhara in its philosophical aspects and in the light of the concept of ahimsa with inscriptional and Agamic evidences in its support.

The entire ethical code of Jainism is directed towards the attainment of complete liberation of soul from the karmas (pudgala) through introspection and penance (tapa) so that the cycle of rebirth comes to an end or atleast gets minimised. In actual practice, the methods of penance are more popular for self purification than those of meditation in the Jain community.

Even in the modern times there are examples of this kind of self undertaken tapas where the Jains have resolved to live without food and nourishment for a continuos period of more than two hundred days. Dr. Hermann Jacobi who has correctly assessed this aspect of the Jain's cult has stated : "Among austerities, fasting is the most conspicuous. The Jains have developed it to a kind of art and reached a remarkable proficiency in it."

The basic concept underlying the vow of Santhara is that a man who is the master of his own destiny should resolve himself to follow the best method of leaving the body. A Jain resolving to undergo Santhara knows it well that he has eaten a lot of food to sustain his body during this life. Now, when the body does not cooperate to help in living meaningfully any more, the person should resolve for Santhara. During Santhara one must not wish to live on or desire sensual pleasures but equally he must not seek for death to come swiftly.

A certain section of Jain masses believes to the extent that the present life will be meaningful only if a person observed Santhara at the end of one's life. It is done with the belief that the departed soul may find a place in heaven after death. There are so many evidences in agamsautras regarding this belief. Therefore, the person who observes santhara gets respect from the society. The occasion is celebrated in a festive mood and manner by the Jains.

It is true that the Jains preach Ahimsa by saying, 'All jivas want to live and hence one should not kill any living creature'. But thinking deeply Ahimsa is basically meant for one's own liberation . If one resolves not to kill or harm any living creature, then one's own anger, pride, greeed and attachment will automatically subside and he shall become free from worldly sins. Santhara is basically conceived and practised on the principles of Ahimsa, as one does not desire for death and does not harm consciously even the suksma jivas (very tiny living creatures) of the earth, water and fire. There are no psychologial or sociological implication involved in it as one takes the oath voluntarily and willingly and does not harm oneself or any other member of the society at large.

It has been clearly emphasized that Santhara should not be undertaken without the permission of the guru (religious preceptor). The guru does not allow a person to undertake Santhara who suffers from some mental abnormalities and lacks the instinct of self preservation. The guru also does not allow Santhara in such cases where one wants to relieve the members of his family from financial or worldly liabilities due to miserable poverty . The grant of permission of the guru eliminates the cases of 'bala marana' i.e. suicide.

It is remarkable to note that if the vow of Santhara is taken with the ulterior motives or

with a desire for material gains (niyana) in the next life, then it is regarded as sinnful and considered as suicide. In undertaking Santhara, the intentions are mainly spiritual-cum-situational and the sole aim of the the action is the purity of soul. Hence Santhara is in no way against the basic principles of Ahimsa.

There is a method described in the old scriptures for taking the vow of Santhara. First of all adoration should be done to Arhat and then adoration to siddha, and then it is incumbent to bow one's head in the name of all religious acharyas and finally to resolve to undertake fast unto death. The Acaranga Sutra has explained three forms of Santhara :

(1) Bhaktapratyakhyana marana
(2) Ingita marana
(3) Padapopagamarana

The last two forms are differntiated by the bodily movements. In one case, bodily movements are completely prohibited while in the other, the movements are partially allowed. There are different forms of Santhara and their details in old literature confirm that every care has been taken to aviod himsa at any stage.

Inscriptional Evidence

The numerous instances of Santhara collected from the Jain inscriptions cover a period

of about two thousand years. The inscriptions at Sravanabelagola provide a very important source material, which prove the existence of the continuous tradition of Santhara in South India. The inscriptions reveal that the period of fast varied from three days to one month. Out of the eight epitaphs at Sravanabelagola, sixtyfour commenmorate the death of men, mostly monks, and sixteen of women, mostly nuns. The term Santhara has been used only in three inscriptions- Nos. 118, 258, 389, while in several others the words samadhi and samnyasa are used which are synonymous to Santhara.

Agamic Evidence

Tirthankare Parsva and Aristanemi undertook the vow of Santhara and realised 'Nirvana' after a month long period of abstinence.

There is a frequent mention of Santhara in the Agamas when the end came to the vower after a month long fasting and and abstinence. The fact that Santhara was undertaken by the monks- Khandaga, Dharma, Megh, Tisak and Five Pandays, Anirudhakumar, eight queens of Lord Krishna, and Nanda (the queen of king Srainika) who became nuns is being recorded in the Agamas. The names of sravakas (householders) like Ananda and various others are being mentioned in the Uvasagadasao.

These Agamic and previously mentioned inscriptional evidences suggest that Sallekhaha was being observed by the Tirthankaras, monks, nuns and by the housedholders alike. In observing Santhara sravakas and sravikas did not lag behind the monks and nuns.

Thus, from the point of view of the Jains, Santhara is not a form of suicide. It is therefore, approved by the Jains on moral and ethical ground, while suicide has never been authorised and sanctioned by the Jain scriptures and guru. Instead, it has been strongly condemned and disapproved as a religious means of putting end to one's life

卐 卐 卐

7

CONTRIBUTION OF GERMAN SCHOLARS TO JAIN STUDIES

The contribution made by German Indologists in the field of Jain studies is tremendous. Their contribution is one and half century old now arousing our curiosity to know about it in details. In the sixties of nineteenth century, a German scholar, Karl Buhler, who served the then Indian Government was sent out to collect manuscripts. At the same time a young German Indologist, Hermann Jacobi, came to

India for a tour of the country. Buhler made his plans known to him and accompanied him in his search for manuscripts. Both of them went together among others to a famous fort of Jaisalmer. Perhaps. they were the first westerners to visit that town.

Karl Buhler while collecting manuscripts obtained permission from the Indian Government to collect duplicates and hand them over to the Berlin library. In this way a rich collection of Agamas and other works reached Berlin and they were taken care of leading Indologist of that times, Albert Weber. In his painstaking work of many years, he immersed into the then almost impossible jungle of entire scriptures. And Prakrit knowledge was then very limited and Jain manuscripts were practically unknown till then. He prepared magnificent catalogue of those manuscripts. In its foreword he writes, "The good deal of my power of vision is carried in them" With the help of that catalogue he gave the first summary of the canonical Agama and initiated Jain studies in Germany.

However, the first translations of Jain sources into German date back to the middle of the nineteenth century when O. Bohtlingk published a German version of *Hemacandra's Abhidanacintamani (1848).* Albrecht Weber published some parts of *Satrunjayamahatmya (1858)* and *Bhagwati* (1866). Albrecht Weber was a genius

par excellence and almost unbelievable diligent. At time's when editions of Indian texts were still very rare, he read innumerable manuscripts and contributed more than any other Western scholar to the early knowledge of Indian literature. From Georg Buhler he had received a large number of Jain manuscripts, mostly from Gujarat. On their basis, A. Weber was able to present an almost complete survey of the canonical literature of the Svetrambara sect of the Jain community. After these beginnings, and encouraged by A. Weber, several German scholars set to work on the Jain writings. We should particularly mention Ernest Leumann (1859- 1931) and H. Jacobi whose works on Jainism are the most important in the early period.

In the eighties, Jacobi translated two volumes in the series of sacred books of the east. The *uttradhyayana*, the *acharanga*, the *suyagaanga* and the *kalpa sutra* and part of them also he edited. First of all was the *acharanga,* first critical texts editions were made in Europe and thus Jain studies began. These were real pioneers in then almost unknown field of studies and it must particularly be recorded that Weber was still of the opinion that Jainism was but a sect of Buddhism. The opinion was widespread that the Jainism was nothing but an offshoot of Buddhism, and it was Hermann Jacobi who definitely proved that this was not the case and Jainism was an old religion, as old as or perhaps even older than Buddhism.

Jacobi convinced western scholars that. Buddha and Mahavira lived at approximately the same period. In 1948 the Jain community in India has gratefully acknowledged its debt to H. Jacobi and published collection of his articles under the title 'Studies in Jainism'. Jacobi was responsible for many text editions also of non-canonical later works. For example, Haribhadra's famous novel of *Samaraichchkaha (1921), upamitibhava prapanchakatha* of siddharshi etc. These voluminous works are all in careful critical editions and most of them are published in India, with long introductions and English summaries facilitating their use by western scholars.

At the same time, Ernest Leumann worked on Jain studies. He was of Swiss extraction but he always worked in Germany, so that it was sometimes almost forgotten that he was not really a German but a Swiss German-speaking Swiss. Leumann did a lot of pioneering work. He edited *Uvavai sutta* and the *JiyaKappa* and particularly he did splendid spadework on what he called the *Avasyaka Erzealong* or literature. At his time very few texts were printed and he succeeded in getting through Strassberg where he was then working among magnificent collection. Leumann did what was almost unbelievable. He explored the whole literature then absolutely unknown only from manuscripts without the help of any printed books. He made some very good text editions but could only begin this work. He had to leave

unfinished, when he died in 1930. Sanskrit department in Hamburg University preserves all the papers left by him. Many of them already used by now and still more awaiting to be taken out of the big almirahas which they fill completely.

One of his life events shows his remarkable achievement though it has nothing to do with Jainism. In the first years of twentieth century, Sir Auraulstein explored in Eastern Pakistan and brought from the sands of the desert, block prints and manuscripts partly of the Sanskrit work of the highest value for the literary history of India but partly also of manuscripts and block prints in an Indian scripts in Brahmi but a totally unknown language. There was then the International Congress of Orientalists in Copenhagen and Stein made a brief report to that conference about his discoveries and findings and Leumann asked him to lend him some of these manuscripts in unknown language, to his hotel. In one single night he succeeded in deciphering enough to prove that this was the new Aryan language and he could even make the first speech on them on this congress, an almost unbelievable feat.

After a period of extensive research in the literature and history of the Jains it remained for two scholars of the next generation to write the complete exposition of Jainism and its teachings. One was the late Helmuth von Glasenapp whose *Der Jainismus eine indische Erlasungsreligion*

appeared in 1925 the other was Walther Schubring (1881-1969) and he was the pupil of Leumann.

Schubring published quite a number of canonical works. The foremost amongst them is the disciplinary text of the *Brihad Kalpasutra*. An edition and translation of this fundamentally important text formed his doctoral thesis in strassburg. Afterwards, he published *vyavaharenisiha*, a critical edition of the first part of *Ayeranaga*, and his most monumental work entitled in English "the Doctrine of the Jains" where he endeavored for the first time to draw complete picture of lord Mahavira's teachings, and, of course, on also the History of Jain community and the History of Jain literature and all the entirely founded on first hand knowledge of the canonical texts.

So far, Jainism has been studied mostly with the help of medieval sources. Jacobi also did the pioneering work in the field but Schubring succeeded in not only reading through but also mastering the whole swetaber siddantha and working it up in this master piece work which was later on translated into English.

It should perhaps be mentioned that after the study of different prakrits by Jacobi, Pischel. Geiger and others, it was felt that the interval between these languages and the modern idioms had been unduly neglected. Therefore, studies in

Apabhramsa were taken up by Ludwig Alsdorf (Hamburg) and Klaus Bruhn (Berlin).

L. Alsdorf 's first special field of work was Apabhransha. He published studies on some Apabhransha tales in one of the works dealing with Jain King Kumarpala of Gujrat. Then afterwards it was Hermann Jacobi to whom he came to know in his very last years, the fact that he met him personally, Jacobi entrusted to him a manuscript of Apabhransa work that had been sent to him from India. It was the *Haripurana* part of *Trisastimaha purusagun alankare* of puspadanta. a big epic, and he got this shortly before he went to India, in 1930, and in India he was able to photograph two more manuscripts of that work. So that he was able for the first time to edit a big Apabhransa text with the help of several manuscripts, with long introductions dealing with the development of Jain universal history, the parallel works and so on.

In India, Alsdorf was presented by the Munimaharaj Punyavijay. Among other works with his edition of *Vasudevahindi* of Sangadasa and when he examined this work after his return to Berlin. He discovered that there was a unique Jain contribution to Indian literature namely the oldest literature, the oldest version of the famous *Brihat katha* of Gunadhya. It was an independent version with considerable changes. He began working on these texts but Second World War interrupted his work. Afterwards he devoted last

years of his life to studying the older commentaries on the sacred writings, The Nijjuttis. Bhasyas. and Churnis and he suggested this as fruitful field of research to several of his pupil.

The Indian scholar Prof. A.N. Upadhay carried his work. Mrs. Mette (munich), the disciple of Prof. Alsdorf published the first complete translation of considerable portion of Ogha Nijjutti. It is one of the most interesting disciplinary texts giving the rules for begging practice of the monks and other things. This text is extremely difficult to understand but invaluable not only for the understanding of its canonical predecessors but also for the knowledge of the history of monkhood in medieval times, also for ordinary daily life in medieval times. It gives a wonderful picture of medieval Indian culture. It must be said that western research was almost exclusively centered on the swetamabara as they had the availability of canonical scriptures

It is a matter of great concern that at present, the young generation of scholars is unable to uphold the old and famous tradition of Jain studies in Germany. The reasons seem to be evident. The scholar does not want to devote the long period for which he has to learn Sanskrit, then Prakrit and then Jain studies. In Germany, the learning of German language is compulsory so to add the learning of two more languages i.e. Sanskrit and Prakrit becomes difficult for the

scholar. Any attempt made to study Jain literature directly will certainly attract the scholars for research work and the old traditions of Jain Chairs in the Department of Indology in Germany may flourish. However, even today leading figures like Klaus Bruhn, Mrs. Mette are sufficient proof that this great tradition of German Jainology is still alive.

卐 卐 卐

8

NON-VIOLENCE AND NEW WORLD ORDER

We are living in an age of great paradoxes. If science and technology have opened up new frontiers of unprecedented human progress, they have also brought mankind to the threshold of total anarchy. One may argue here that it is not science or new technological revolution which has produced anarchy, it is those who misuse or misapply them for their ulterior goals. But the

basic question is how can one contain and curb the pernicious impact of the culture of overconsumerism. For consumerism is the result of industrialisation and industrialisation is the result of the application of tools and techniques of science. High profile life styles have changed our humane approach to human problems.

Our mind boggling ostentatious way of life is at the cost of others. Since the fruits of development of modernisation have not yet trickled down to the lowest strata of society, an endemic struggle for existence is bound to create a violent social order. Whatever forms of militancy, terrorism, or violence we see around us are mainly due to economic reasons. Frustration is overpowering our unemployed youth, both skilled and unskilled. They are perpetually haunted by a sense of economic insecurity. Can we bring about a non-violent, the peaceful and stable social order in the face of economic challenges? What are the means and methods to tackle the ever deepening problem of violence all over the world?

Let us make an attempt to understand the dynamics of non-violence in an emerging new world order. Tentatively, some alternatives will be suggested within the broad frame of non-violence to make this world order relatively non-violent and peaceful.

The doctrine of non-violence was propounded by the oriental teachers several

millennia ago. Lord Mahavira, Lord Buddha, and Leo Tolstoy and Gandhi in the modern times taught us to practise the philosophy of non-violence in our day to- day life. Lord Mahavira's basic postulate of non-violence in thought, deeds and actions is the guiding pillar for the entire mankind irrespective of geographical, religious, and sectarian considerations. According to him, non-violence can be practised by cultivating right knowledge, right vision and right conduct. Once we cultivate these three virtues, there is no room for violence.

In Gandhian non-violence also the emphasis is on improving one's conduct. Gandhiji reiterated that non-violence needs discipline which can come through education. In his Nayee Talim (New Education), he pleaded for basing it on truth and non-violence In his speech at a prayer meeting on December 14,1947, Gandhiji exhorted people to liberate mankind from all the ills of the world through imparting correct education. He said: "Education that is not rooted in truth and non-violence is no education in the proper sense of the word".

To Gandhi, learning and higher education have no meaning unless the "satan" inside us is thrown off. Co-existence can be fostered through non-violence at the" intellectual level." The basis of world peace is coexistence through the instrumentality of non-violence. The New World order has, therefore, to be based on co-existence.

If great powers fail to exist with small powers out of sheer arrogance of power, the world can never be safe. Here the concept of security is to be related to the diffusion of economic resources. If concentration of economic power remains in the hands of a few industrialised nations there will also remain a perpetual fear of tension, of violence and blood shed. For poverty breeds violence. And violence breeds instability in the world.

The alternatives suggested here to overcome violence are:

(i) Coupling education with non-violence studies;

(ii) Diffusion of economic resources;

(iii) Training of non-violence through active, informed participation of small human groups at the grassroot level;

(iv) Fostering international understanding through cross-cultural interaction by holding periodical seminars and conferences.

Each one of these alternatives, has its own relevance. One need not take them in isolation from the other. Their effectiveness depends on how much true education one has gained beginning from childhood. One need not be panicky that education is a long process, and it may be a tortuous path to inculcate the spirit of non-violence. Let us start from now. If education in

non-violence or training in non- violence may not be relevant for a middle- aged person or for an old man since he has cultivated fixed ideas over the years, let our education be for the kids. They will grow over years and would be under constant interaction with right- minded people. They will turn out to be men or women free from biased knowledge, narrow thinking habits and inhuman behavioural patterns.

卐 卐 卐

9

UNIVERSAL SPACE

Many of the deeper problems of nature have a long history of thousand of years. This is certainly evident to the philosophers and thinkers of different parts of the world who tried to explore the nature of the universe. During these years theoretical physicists have taken the lead in exploring the largest of the large and the shortest of the short of this universe. Many current ideas about the cosmos, space and time have been presented by the scientists, which seem to have precise details in the ancient (300 B.C.) Jain

Agamic literature. Jain texts define space as 'space accommodates all substances' or 'it is the location of all substances'. Substance means an entity which has the property of permanence through change and has qualities and modes.

Substances or reals are six in number which constitute the universe: The soul, matter, a medium which facilitates motion, a medium which facilitates rest, space and time. Other than matter, rest of the five substances are non-material in nature.

Jains believe that space is infinite but the universe is finite. The finiteness of the universe is not due to any limit of space but due to the limit of the twin substances 'the medium of motion and the medium of rest'. In the absence of these twin substances, matter and soul can neither move nor can they occupy any part of the space for stop. Though, motion and rest are the two states which are characteristic of matter but motion and rest of the matter require an aid of the medium.

In the field of science, while studying the propagation of light it was suggested that there was a substance called the 'ether' that was present everywhere, even in 'empty' space which provides aid to motion. It was proposed that light waves should travel through ether as sound waves travel through air. But in 1905, Einstein pointed out that the whole idea of ether was unnecessary.

The Jains did not conceive any entity like ether but proposed the existence of twin substances in space which are devoid of empirical qualities (non-material) continuous and pervading the whole occupied universe. They have no form. They do not initiate motion or rest of matter but they facilitate motion or rest. These twin substances are found only in the occupied universe, hence no matter can move out of Universal space into the acosmic space.

Jains stand alone amongst the other ancient philosophies in believing these twin substances which are known as Dharamastikaya (medium of motion) and Adharmastikaya (medium of rest). The finite portion occupied by these twin mediums in space causes the universe to be finite. Jains have specially mentioned that a ray of light or even the wave of sound cannot travel without the medium of motion.

During last fifty years, a tremendous effort has been made by scientists to know about of the nature of the universe. Einstein's theory of relativity and the concept of entropy have suggested that he Universe is finite. Arthur Eddington stated that the Universe is also unbounded. He explained that the universe is indeed finite, limited as it is by the space it takes up, but the space does not limit it with boundaries. This concept left room for the possibility of the existence of something beyond this finite and unbounded universe of space.

Though Jain cosmology treats the identity of the medium of motion and the medium of rest independent of the substance space, the unit-points of the twin substances occupy the same space as that of the space points. Sometimes, this causes confusion. Jains, therefore, termed the unoccupied space as Aloka (acosmic space) and the occupied space as Loka.

The finiteness of the universe has also been supported by Newton's law of gravity, which states that every body attracts every other body with a force that is proportional to the mass of each body. Stephen Hawking says that it is gravity that shapes the large scale structure of the universe.

We find that when we combine quantum mechanics with general relativity, space and time together form a finite, four dimensional space without boundaries. Conclusively, it may be said that the finiteness of the universe has been dealt within Jain Cosmology and in modern physics. Jains concept regarding the finite universe is much more clear as Jains conceive the presence of unoccupied space (Aloka) all round the universe. This concept of Aloka (acosmic space) is helpful in explaining the unboundedness of the universe.

In the Jain literature, we find a unique description of the eight point centre (Ruyaga Padesa) of the Universal space. The concept of eight point centre for the universe suggests that

there is liklihood of the change of centre along an oblate sphere. (like a pressed water drop). The oblate sphere intersects the edges of the eight Ruyaga Padesa which lie near the geometrical centre of the universe These Ruyaga Padesas are comparable to the udders of a cow. The concept of eight point centre of the universal space directs to idea of the shifting of the centre, whenever needed. For such a universe where the centre may shift, the universe cannot have boundaries.

Jain scriptures provide one more evidence for the finiteness of the universe. Out of the six realities of the universe, soul is one of them which has a unique property of contraction and extension. When the soul fully expands itself during *kevali samudghat* it pervades the whole universal space. It shows the limitation of the Universe in the space. It is worthwhile to know that the medium of motion, medium of rest, the maximum extension of soul have their smallest of ultimate units equal to the ultimate units of the Universal space. This limit of the Jain cosmological theory, maintains the Universe stable.

However, it should be kept in mind that Jains have taken into consideration the two categories of the numbers :

1. **Finite and Infinite**
2. **Numerable and Innumerable**

In our above discussions, the second category has not been employed. It may be treated separately.

According to the Jains, the universe is eternal. The universe has neither been created by God nor is there a beginning of space and time with the Big-Bang or the end of space and time with the big crunch. Einstein once asked the question "How much choice did God have in constructing the universe.?" Jainism is the only eastern ancient philosophy which does not accept God as a creater of the universe, but proposes that natural laws are responsible for the creation of matter from time to time in this universe.(Here we find a similarity in Jain philosophy and science).

In the creation of the universe, if time and space came into being only with Big-Bang, as the scientists propose, it does not provide a satisfactory answer to the question: what was there before the Big-Bang?. Was there neither space nor time and are headed for a future when there would again be no space or time?. It is highly commendable that physicists are giving answers to these questions which are related to the philosophers.

The great physicist Dr. Hawking tells us "All our theories of science are formulated on the assumption that space-time is smooth and nearly flat, so that they break down at the Big Bang

singularity, where the curvature of space-time is infinite. This means that even if there were events before the Big Bang, one could not use them to determine what would happen afterward because predictability would break down at the Big Bang. Correspondingly, if as it is the case, we know only what has happened since the Big Bang, we could not determine what happened before hand. As far as we are concerned, events before the Big Bang can have no consequences. So they should not form part of a scientific model of the universe. We should therefore cut them out of the model."

Jain philosophy proposes the non-beginning and non-ending of the universe and explains time as a wheel moving in a clockwise direction and divided into cycles each of two equal parts. These cycles of time follow one after another in unbroken and unending succession indefinitely. After the end of the half cycle, a partial end of the world takes place. This partial end means that great landmasses submerge under water but that complete annihilation does not take place. The idea of Big Bang and the Jain concept of pralaya after the end of this half cycle, does not have the same meaning, but some type of similarity does exist there.

Science has put forward several theories of how the universe may develop and end but no single theory has yet found complete acceptance, largely due to the theories being incompletely

worked out. It is believed that the expansion of the sun or the cooling of the sun or the depletion of ozone layer may cause the destruction of the earth but according to the Jains, such destruction will always be partial in nature and the Universe will again develop and will remain endlessly.

卐 卐 卐

Dr. M. R. Gelra

Born at Jodhpur on 20th March 1933, Dr. M. R. Gelra is an Emeritus Professor in Jainology, Jain Vishva Bharati Institute (Deemed University) Ladnun. He is M.Sc. and Ph.D in Chemistry.

Dr. Gelra with a long track record of his services in higher Education for more than three decades retired as Director, College Education, Government of Rajasthan.

Dr. Gelra has had the privilege of adorning the office of the Vice-Chancellor, Jain Vishva Bharati Institute as its founder V.C.

His expertise in the comparative field of Jainism and natural sciences is too well-known. He has widely travelled all over the world for participating in many international Conferences, Seminars, Workshops etc.

Dr. Gelra has been honoured for the inaugural Mahadeolal Saraogi Jain Agam Manisha Purushkar (2002) in recognistion of his noted Contribution to Jain Spiritual Literature.

SCIENCE IN JAINISM

Dr. M. R. Gelra

JAIN VISHVA BHARATI INSTITUTE
LADNUN