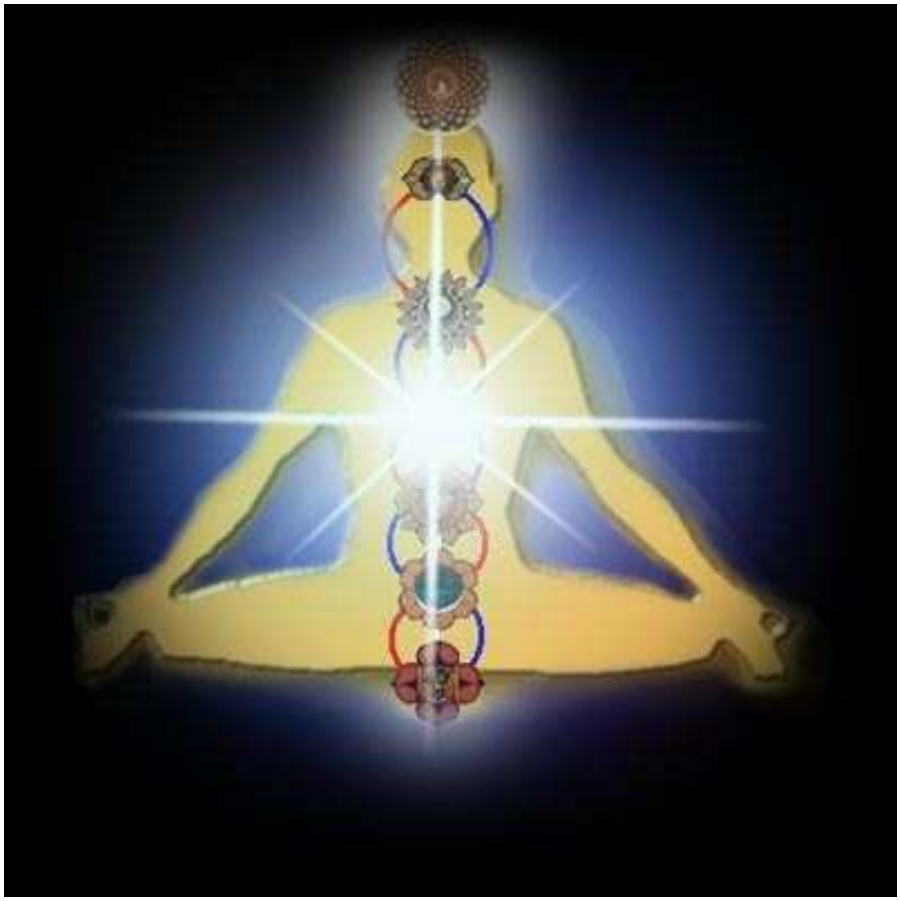
Jainism: *The Eternal and Universal path for Enlightenment*



Narendra Bhandari

Jainism: The Eternal and Universal path for Enlightenment

Author: Dr. Narendra Bhandari
(nnbhandari@yahoo.com; WEB: nbhandari.com)
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Contents

Theme

Jainism is based on the five pillars of *Ātmavād, Anekāntavād, Karmavād, Kriyāvād* and *Lokavād*. Of these, *Anekāntavād* (true nature of things) and Lokavād (cosmology) come well within the purview of science and therefore Jainism is considered to have scientific foundation. Jainism thus considers matter and universe as real and not illusory, as some other faiths claim. This book is an attempt to identify common concepts between Jainism and various aspects of modern science.

The basic concept on which Jainism has developed its procedures is that humans have unique capabilities and, of all the sentient beings, only humans have the capability of attaining enlightenment. It is believed that the human birth results after lots of good karmas or *punyas* are accumulated in the previous births and this opportunity should be used for striving for attaining *Mokṣa*. According to modern science, all living beings have the capability of drawing energy from the environment at the physical level. All physical and chemical processes, occurring in isolation, result in increase in entropy. Although this law, known as the second law of thermodynamics remains valid for any biological system considered together with its environment, in "isolated" living systems, per say, the entropy decreases, that is, it physically draws energy from the environment.

The fossil record of species shows that life has gone through Darwinian evolution of natural selection from very primitive conscious algal form to humans which have the highest level of consciousness. In this chain of evolution, there were two major and abrupt revolutions: the first one occurred about 600 million years ago when mobile forms of life evolved. Till then the evolution was through transmutations based on environmental interaction. The second revolution occurred recently, about 200000 years ago, with the emergence of *homosapiens*. Jainism proposes that besides the physical level where all living beings interact with environment, humans can draw energy at mental and consciousness level. Secondly they can enhance their consciousness level at will, by practicing certain procedures.

Enlightenment implies development of several faculties. Bhagvān Mahāvir, when he attained enlightenment, developed four main faculties: infinite potency (*Anant Virya*), infinite consciousness (*Anant Chaitanya*), infinite wisdom (*Anant Jnān*) and infinite bliss (*Anant Sukh*). Although all these four appeared at once, the first two, *anant Virya* and *Anant chaitanya* appear to be the cause and *Anant Sukh* and *Anant Jnān* are the consequences. *Anant Virya* requires infinite potency and its source must be the whole cosmos which is full of energy. Various sources of energy around us are the earth and its biosphere, sun, galaxy, cosmic rays etc. Bhagvān Mahāvir has shown us procedures to get or draw bio-energy from the biosphere by practicing non-violence and other forms of energy through meditation and *tapasya*. The basic law of physics is that energy flows from higher level to lower levels and therefore these procedures are

meant to bring us down to the lowest energy levels where the energy from various sources starts flowing in. Energy of a thought is enough to raise the energy level above the environmental energy level and therefore one has to go to the state of no mind (no thought) to receive any energy. When any form of doubt, attachment, anger, greed, and pride fully subsides then environmental energy starts flowing in. The cosmos is full of energy. There are energy centres in the environment, such as mountain tops, temples, trees and water reservoirs which can transmit energy to humans and there are receptive centres in the body which can receive such energy. We still do not know the form in which this energy flows in but a guess is that it must be in a form of particles hitherto not discovered by physics. Meditation also increases the consciousness level to higher state. Thus Jainism prescribes a path to enhance the energy and consciousness levels by certain practices. Humans are the only species who can sit in isolation and increase their consciousness level, albeit in infinitesimal steps, unlike other species.

If we look at the history of the mankind and leave aside small hiccups, a certain direction of progress becomes clear. The humanity is moving towards freedom of all kinds, the ultimate aim being freedom from the cycles of birth. This freedom has to be preceded by freedom from mind, which in turn will be preceded by freedom from various other factors. The first revolution was the agriculture revolution to make humanity free of hunger and less dependent on nature. Then came the industrial revolution which brought in automation which provided material facilities and comforts and made us free from the worry of things of daily use. This was followed by the communication revolution to make it easy for us to communicate and learn from each other. The knowledge revolution is currently in progress with information easily accessible. This will be followed by social freedom, the most difficult of all, because we are intricately bound by social, family and personal traditions and mindset. This will soon be followed by revolution in thought and in consciousness level. We are inevitably moving in that direction. These revolutions are all recent phenomena over the past 10,000 or 20000 years and they are occurring progressively rapidly, from millennia to century and then to decadal scale, leaving us in no doubt in which direction the nature is evolving and wants us to evolve. Jainism and Buddhism are surely going to be the light houses for the next revolution. This is the underlying approach taken in this book. Although in this book Jainism has been considered in detail, the procedures are applicable to any body and one is not supposed to take anything as a matter of faith but is encouraged to weigh everything scientifically before accepting it. Part 1 of the book deals with the basic concepts of Jainism and part 2 deals with various aspects where there possibly is some overlap between science and Jainism. Much research will be required to prove if the various points raised are scientifically correct or require critical evaluation. If this approach is validated with open mind, the efforts in compiling this book will be deemed worth while.

Preface

Amongst the various "religions", "faiths" or philosophical sects known to mankind, Jainism is not a "religion" or "faith" in the normal sense. It is actually a "path" enunciated by the Enlightened souls (*Arihants*) who were born ordinary persons and attained enlightenment by following this path. These *Arihant*s belonged to any nation, religion, creed, class or society and therefore Jainism is not restricted to any particular group of people. In this sense it is universal. It is said that at any time there are millions of enlightened souls (*Kevalis*) in the universe. There may surely be other paths. with which Jainism has no conflict, but Jainism surely is one path for attaining enlightenment, enunciated by the Enlightened beings for those who seek enlightenment. It has well defined milestones (*Guṇsthāns*). They are fourteen in number (Chapter 5). *Guṇsthāns* (stage) 1 and 2 are starting points and stage 14 is considered to be the ultimate goal of every living being. The procedure for completing this journey is the main goal of Jainism. One is born in various *yonis* (species) which should be treated only as a detour from this path to enlightenment and once, one is back from these loops as a human being on the main path, one can continue the pursuit of this goal.

Jainism has given equal importance to the understanding of the physical universe and individual's physical, mental and spiritual development. All these aspects are equally important for achieving the goal. Unlike some other oriental religions, it does not consider the world as an illusion, nor does it believe in a supreme "God", the Creator. It claims that both, living and non-living are governed by certain laws and in this sense it claims itself to be quite scientific. It believes in the laws of Causality in spiritual as well as physical realms, as modern physics claims for the physical universe. There are, of course questions of fundamental import for both, those who believe in God and those who do not, that cannot be answered satisfactorily and are beyond logic. If God created every thing, who created God? The answer is that he is eternal, self created or *swayambhu*. The same questions arise for those who believe in nature or laws that

govern the universe. Who created laws and why the laws are as they are and not different. The theist can take refuse behind God who created the laws as they are, but then this takes the question only one step back. We can only say that the nature is like this, like what we observe; the laws are eternal and are in the nature of things. To find a deeper meaning to the answer one must strive for enlightenment. This is the purpose of Jainism.

The basic approach of Jainism is that the purpose of all living beings is to develop consciousness to the fullest extent so that the true nature of the universe is experienced.The sensory organs have limitations of perception and can not know the true nature. Jainism has given highest status to humans, even above "heavenly" beings (*devas*) and other forms because only humans are capable of **conscious evolution**, by will or by thinking, by adopting certain methods. No other species has this capability and all other species are at the mercy of the environment to evolve either in a passive way or by active interaction.

The Universe consists of two entities: *jiva* (living, which can be called bios) and *Ajiva* (non living, which includes matter and other non-living entities that control its transformation). The ultimate goal of *jiva* is to completely dissociate itself from material and attain a pure state where after it resides on an edge (the upper edge: *Siddha śhil*â) of the Universe, separated completely from the material world. That is probably the ultimate state, where *jiva* and *ajiva* are completely separated and free of each others influence, towards which the whole universe is evolving. To understand the basic approach of Jainism and to understand the path to enlightenment, it may be desirable to reinterpret Jainism in terms of modern thought and amalgamate it, as far as possible, with modern scientific knowledge.

Jain darśan (or philosophy) is one of the oldest and original systems, independent of all other thoughts, conceived and enunciated by Riṣabha, who reigned over India. The time of his rule is not well determined. It is prehistoric (Older than Mahabharat and Ramayan), certainly pre-Indus (older than 1500 BC) since seals depicting Jain saints and practitioners of Jainism are found in Mohan Jo Daro, Harappa, Mathura and other sites and inscriptions of *Siddha*s and *Arhats* are found in Udaigiri hills and Hathigumpha. It is also mentioned in Rigveda, considered to be one of the oldest

books in the world (ca ~3000 BC) and also Yajurveda, written a little later. Lot of research has been done on the antiquity of Jainism, to ensure that it is not an offshoot of Vedic or Hindu philosophy (as is sometimes mistakenly believed). In fact many Jain concepts are contradictory to Vedic concepts. I do not wish to go into these details here, except to mention that Jain Arhats (Riṣabha and his parentage) and *sādhus* (called *Vratya* or *Vatarsana muni* or *Nigantha*) are quoted in some of the oldest sacred Hindu scriptures like Shri Bhagvatpurana, Vishnu Purāna, Padma Purāna etc. The inquisitive reader may like to refer to some of the references, given later in this chapter to appreciate the originality of thought and antiquity of Jainism.

Over the millennia since Riṣabha, Jainism propagated through practices and preachings. Parashva, about 2900 years ago (Before Present) preached the Chaturyāma *Dharma*: the four fold religion based on abstinence from violence (*himsā*), falsehood and stealing and acquisition of material things. 250 years later, the last of the Arihants, Mahāvir, introduced *Brahmacharya*, generally equated to celibacy, as an essential requirement for attaining salvation. The basic essence of Jainism was compiled by the immediate disciples of Bhagvān Mahāvir, who preached Jainism about 2600 years ago. These disciples, the "Gandhars" were omniscient (shrut *kevalis*) and described various theories of Jainism and Jain practices. Later these teachings were memorized verbatim by sages for several generations and were ultimately documented in scripture form known as Āgams, several hundred years after Mahāvira's nirvana. These sūtras were divided into two major groups: *Ang Āgams* containing direct preachings of Mahāvira which consist of 12 texts. The twelfth text is called *Drstivad* (which included 14 Purvas) and *Ang-bāyha Āgams* which provide explanation of *Ang Āgams*. There is difference of opinion on the number of *Ang-bāhya* Āgams and their numbers vary from 14 to 34 as accepted by various Jain sects.

Around 350 BC, about 250 years after Mahāvira, there occurred a difficult period of continuous famine for twelve years resulting in a break in the tradition of memorizing Āgams and during this period a significant number of Āgam Sūtras were largely forgotten. The Digambars consider ***Shatkhand Āgam***, written by Ācharya Pushpadant and Bhutbali (and its commentary **Dhavala tik**â, written by Ācharya Virsen) and ***Kasay Pahud*** written by Ācharya Gundhara between 100 to 900 AD (and its commentary later written in 780 AD by Virsen and Jinsen) and four Anuyogs (which includes about 20 texts) as their main texts. ***Padma Purān, Harivansh Purān, Ādi Purān*** *and* ***Uttar Purān*** written between 650 and 879 AD, constitute ***Dharma Kathanuyog; Charnanuyog*** (consisting of **Mulachar, Trivarnachar and Ratna**

Karanda-Shravak Achar); ***Ganitanuyog*** (consisting of ***Surya-prajnapti, Chandra-prajnapti, Jaya-Dhavala-tika*** and ***Gommat-sar*** (written 780-1000 AD) dealing with astronomy, astrology, geography, and mathematics. The philosophical doctrine, theories, metaphysics, Tattvajnan, are contained in **Dravyanuyog** which consist of **Niyamasar, Panchastikāyā Pravachanasār** and **Samaya-sara** written by Ācharya Kundakunda (ca 100 AD); **Tattvartha-sutra** by Umaswati (~200 AD) and its commentaries and **Aptamimāmsā** by Samantbhadra (600 AD) and its commentaries by Akalank and by Vidyanand (800 AD).

Svetambars, on the other hand, held several conferences[1], at Patli Putra (about 367 BC), Orissa (~150 BC), Mathura (~310AD) and two at Vallabhi (~454 and ~300 AD) to document the scriptures, as far as they could be remembered. The Swetambar texts are **Achārang Sūtra (Aayārang)** describing the conduct and behavior of ascetics and penances of Bhagwan Mahāvir**; Sūtrakratāng Sūtra (Suyagdang)** describes nonviolence, Jain metaphysics, and the refutation of other religious theories such as Kriyavâda, Akriyavâda, Ajnanavâda, and Vinayavâda; **Sthānanga Sūtra (*Thānang*) and Samavayanga Sūtra)** describing various aspects of Jain metaphysics; **Vyākhyā Prajnapti** and **Bhagavati Sūtra (Viyah Pannati):** This Āgam explains the subtle knowledge of soul, matter, and other related subjects. Thirty-six thousand (36000) questions and answers are presented in this text for clarification of doubts. It is the largest of the eleven Ang-Āgams. **Jnātā Dharma Kathānga Sūtra (Nayadhammakahāo)** explains Jain principles through examples and stories. This text is useful in understanding the mode of Bhagvān Mahāvir's religious preachings. **Upasaka Dashanga Sūtra (Uvasagdasao)** explains the code of conduct of the ten followers (Shravaks) of Bhagvān Mahāvir. This *Āgam* is useful for understanding the code and conduct of individual seekers (Shravaka *Dharma*). **Antah Kradashanga Sūtra (Anatagadasao)** tells the stories of ten sacred monks attaining liberation (*Mokṣa*) by destroying their *karmas*. **Anuttaroupa Patika Dashānga Sūtra (Anuttarov Vaiya Dāsāo)** contains the stories of additional ten monks who attained the top-most Anuttara heaven. **Prashna Vyākarana Sūtra (Panha Vagarnai)** describesthe five great vows (mahavratas) and the five worst sins defined in the Jain religion. **Vipāka Sūtra (Vivagsuyam)** explains the results of good and bad *karmas*

1. Based on *Jain Āgam Sahitya* by Devendra muni. Other scholars have given slightly different dates for the conferences.

through (several stories. **Drstivad[1],** the twelfth Ang-Āgam is of vital importance but is considered lost by all Jain Sects. Its description, which is found in other Jain Sūtras, indicates that this Ang-Āgam was the largest of all the Āgam Sūtras. It was classified in five parts: (l) **Parikarma** (2) **Sūtra** (3) **Purvagata** (4) **Pratham-anuyoga** and (5) **Chulika**. The third part, **Purvagata** contained 14 purvas. They contain the Jain religion's endless treasure of knowledge on every subject. Some scholars believe that it was named as Purva because it contained the knowledge which existed before Bhagvān Mahāvira, largely the preachings of Bhagvān Parshvanath. The legend has it that Srimad Rajchandra, born about a hundred years ago could recall the 7th purva through the knowledge of his previous births (Jāti smaran), which he heard directly from Bhagvān Mahāvir as one of his disciples in a previous birth. He summarized it in his book ***Ātmasiddhi*** and this narration can be taken as authentic (see Chapter 2) version of this section of *Drstivād*.

The various Swetambar Upangs illustrate the teachings of Bhagvān Mahāvir by stories and include **Aupa Patika Sūtra (Ovavaiya) w**hich describes the view of King Konika when he visited Bhagvān Mahāvir. It also explains how a person can attain heaven in the next life; **Raja Prashniya Sūtra (Raya Pasen Ijja)** describes the story of sage Keshi. Keshi was the Ganadhara of Bhagvān Parshvanath. He removed the doubts of King Pradeshi regarding the existence and attributes of the soul. ***Jivabhigama Sūtra*** describes the universe and the subtle description of all living beings (souls) of the universe. It deals with various aspects of biology and botany. **Prajnapana Sūtra (Pannavana)** describes the form and attributes of souls from a different perspective. **Surya Prajnapti (Surya Pannati)** and **Chandra Prajnapati** dealing with astronomy, motion of Sun and Moon; **Jambudveepa Prajnapti** deals withgeography and history: The **Nirayavali Sūtra, Kalpa Vatansika Sūtra (Kappavadamsiao), Pushpika Sūtra (Puspiao),** Pushpa Chulika Sūtra, **Vrashnidasha Sūtra (Vanhidasao)** describe some events and stories during ancient times. Besides there are several **mool Sūtras like Āvashyaka Sūtra** describing

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soul, are called Āvashyak (essentials; Chapter 6). A description of the six routines Samayika, Chaturvinshatistava, Vandana, Pratikramana, Kayotsarga, and Pratyakhyana are explained in this Āgam. The very important **Uttarādhyayana Sūtra** containing preachings regarding religious principles and practices, and many stories, dialogues, and examples based on such principles and practices and **chulikā Sūtras (e.g. Nandi Sūtra,** dealing with various types of *jnān*s) are also main **Upangs.**

The purpose of mentioning the principal Jain scriptures above is two fold. Firstly they provide the source material on Jainism so that the readers who are interested in original texts can refer to them. Secondly and more importantly, we want to emphasise that the texts are only "compilations" by knowledgeable saints and scholars. They were documented many centuries after Bhagvān Mahāvir and although they contain answers given by the Enlightened Arihants, they have been recalled from the memorized versions. For this reason, they need not be taken as accurately *verbatim* because of various limitations in memorizing due to passage of time, evolving interpretation over ages and the influence of other cotemporary thought. The rigidity with which one should take them as the "word of the Lord" should therefore be critically borne in mind.

Science is objective in the sense that it examines and analyses various objects in the universe and is independent of the observer. On the other hand, religion is subjective. It is concerned with the self. Thus science is experimental and religion is experiential. The questions is: Is there another way, other than the scientific approach to arrive at the truth? Can meditation lead to the same end results as the modern scientific tools? And can both of them, science and meditation, be integrated into one holistic methodology? For this purpose, one has to debate issues which have common ground in science and religion.

This book is not intended to be an exposition of the Āgams; rather it attempts to bring out their main aspects in a simplistic and easily understandable way, trying to find some common ground between Jainism and modern science. One should also bear in mind that the original preachings of Mahāvir were in Ardh-Māgadhi or Prākrit, a language long forgotten by the masses and replaced first by Sanskrit and later by Hindi and other regional languages. It is customary to stick to the original texts for sake of purity but although the concepts and cardinal points may be the same, the language has changed over the many millennia and it is extremely difficult to comprehend the original texts, even by the learned scholars since it often includes an element of interpretation. It is difficult to ascertain the veracity of all the texts but, on comparing them with

modern scientific observations, we come to the conclusion that some aspects such as the units of time and space, geography and some aspects of observational astronomy as described in these compilations, have been corrupted (Appendix 1) since they are mentioned differently in different places. This is reason enough for a critical assessment and reinterpretation of as many aspects as possible in terms of modern scientific thought.

There are areas where religion and science are exclusive, i.e. in the domains of spiritualism, and there are also some areas where overlap between them exists, since as mentioned above in the subject matter of various texts, Jainism devotes as much importance to physics, chemistry, biology, botany, astronomy and geography, as it gives to spiritual aspects of soul, and procedures for its purification. There are bound to be disagreements but our effort is to reconcile the two where ever and to the extent possible.

This book is based on my notes prepared to understand Jainism. It should not be considered as an authoritative treatment but rather as a primer, compiled in a book form. The main purpose is that other seekers like me may find it useful and save time in their quest of getting familiar with Jain thought. The book is intended to introduce the reader to minimum basic concepts of Jainism, both in theory and in practice, and the procedures suggested for achieving enlightenment. It is not meant to be exhaustive, nor we quote much from the scriptures to authenticate the version presented here. A learned reader may find that rigour has been sacrificed for sake of simplification, but that is the approach taken in this book. As far as I could understand, Jainism is based on five pillars: ātmavād, Karmavād, Anekāntavād, Kriyāvād and Lokavād. They are discussed here briefly.The book is divided in two parts, the first dealing with the first four aspects and the second part dealing with various aspects of Lokvad. Thus, the first part deals with basic tenets of Jainism and the second part compares Jain thought with various branches of science like physics, cosmology, chemistry and biology. After arguing the universal applicability of Jainism (Chapter 1), the book deals, rather briefly, with the main foundations of Jainism i.e. The cardinal truths (Chapter 2), *Anekāntavād* and *Karmavād* (Chapters 3 and 4). There are numerous books and treatises from learned and enlightened scholars on these aspects and therefore the purpose here is not to deal with these aspects in rigorous or comprehensive way but just to make the reader aware of the essential aspects of Jainism. The later part of this book, Chapters 5, 6, and 7 deal with the path recommended for salvation, as one goes to higher states (*Guṇsthāns*, Chapter 5), by practicing Jain procedures (Chapter 6) which also deals with their physiological and physical effects. The Part II of the book deals with a

general discussion on Jain concepts in light of modern scientific knowledge: Modern Physics (Chapter 7), Cosmology (Chapter 8), Combination Chemistry (Chapter 9) and Biology (Chapter 10).

I have borrowed material from various sources and web sites and do not claim any thing original. Some times the material has been used without verifying their original source and if there is any material which is not authentic, I stand to be excused. Some Hindi words (mentioned in italics) have been retained as they are, since there are no equivalent words in English which can convey the same perception. Translation of some words in to English would have made this book unreadable and difficult to comprehend. Therefore knowledge of both English and Hindi is required to fully appreciate the implied meaning.

I hope that the book will become a bridge in our understanding of Jainism in context of science and provide a philosophical basis, which will be useful for an individual as well as the society and, in howsoever small a measure, make Jainism relevant to the modern way of life.

Narendra Bhandari

1

Jainism: The Eternal and Universal path

Truth is interwoven in the Universe

Fossil record on Earth, Nature's chosen path
Universality of Law,
Self , Foundations of Jainism,

Universality of Jainism

Life is made up of a sequence of situations and we continuously move from one situation to another, sometimes struggling and some times getting the desired outcome. In this process we quickly realise that this struggle has taken up all our life. At the end it appears that the life has been wasted in trivialities. In the ultimate analysis, as far as the physical assets are concerned, life is a zero sum game. One is born with no assets and upon death, leaves all of them behind. The net outcome would not have been different irrespective of the way we chose to lead our life. This can hardly be the purpose of life. This,however, is not true of the conscious assets. One is born with his *sanchit karma*s and, upon death, carries with him the *arjit karmas*. As we will discuss in this chapter, in the scheme of nature, it can be shown that life on earth exists for a specific purpose. Any "religion" is expected to guide us to understand this purpose and help us realise it.

Every age has its specific problems and a "true religion" is expected to show the path to resolve these problems at all times, in all domains and in all possible situations. In this respect a religion has an eternal role. Problems of conflict at all levels (personal, societal, and national), consumerism, terrorism, impact of the life style on environment, to cite a few, are the hallmarks of current era and mental peace or satisfaction is hard to achieve, as many will admit. Much of these conflicts have arisen because science and technology is progressing at such a fast pace, much faster than the human mind can adapt to, and the mental, philosophical and spiritual faculties are not able to cope up with the physical changes thrust upon us. In this era of competitive development of

different faculties there is no time to think what is right and what is wrong. Once there is a scientific discovery, technical progress can proceed with a rapid pace and can take control of our lives. It takes the mind significant time to comprehend, philosophise transform and understand its implications. Failure of all religions to cope up with the progress of science is resulting in loss of their relevance in day to day life. To make philosophy and religion relevant to modern way of life requires that it be reinterpreted in modern, scientific language to meet the contemporary challenges. When contradiction is found between science and religion, the tendency is to choose the former, because it has made itself relevant to our daily needs. Science has made tremendous progress in the past 400 years and can not be ignored. Rather it should be synthesized and integrated with religion to make the philosophy more wholesome and comprehensive. Instead the puritans stick to the age old interpretations and follow them even if they can not be applied to day to day problems and appear irrlevant. This probably is the reason why people, even those who sincerely follow their religion, end up with gradual erosion of their conviction.

In an absolute sense, there is no measure or absolute criteria for right and wrong. What is right today in a given situation can be wrong tomorrow in another situation and what is nectar (*amrut*) for one can be poison for another. In this ambiguous situation it is difficult to decide the correct path, except that we must realize that we are the products of nature and the mother nature is all powerful and is always right. We must therefore take clues from nature.

Scientific studies show that over the 14000 million years since the Universe formed from a great explosion, the "Big Bang" and 4500 million years since the Earth came into existence, *jiva* and *Ajiva*, both have evolved in a certain direction. It seems that the mother nature is proceeding with a goal, a goal of development of consciousness. on Earth. We should therefore first determine the direction in which the nature is going and then decide the direction in which we should proceed , that is, with it or against it; help nature in achieving its goal faster or choose our path without caring about it. We seem to have a choice. We take the help of science or guidance from nature to find and define the "path" the Earth has taken and then we can exercise this choice. Such an approach would not be subjective, nor it would be wrong.

Nature's path based on fossil record

If we look at the history of evolution of species on Earth we find that over time the very primitive species have evolved into the most developed species. Life first started on the Earth about 3500 million years ago. Since then, the nature has been following a direction, a direction of evolution of consciousness. This record is preserved in form of fossils on Earth from the very beginning as shown in Figure 1.1. Let us look at this record in some detail.

Evidence of whatever happens on Earth, in form of any activity involving either living and non-living, eventually gets washed off by rain and rivers in to the sea and deposits there together with the dust at the bottom. The history of life is preserved as fossils in these sediments. It is clear from these records that life on earth began about 3500 million years ago, about 1000 million years after the Earth was formed, with relatively simple single-celled micro-organisms, the first prokaryotes. They evolved into multi-celled (eukaryotic) organisms and then slowly into mobile (moving) and flying species. Mammals and humans arrived on the Earth very recently. Hominids, the predecessors of *Homosapiens* emerged only about 6 million years ago. This sequence or the tree of life is shown in figure 1.1. If we ignore small perturbations which have punctuated the evolution occasionally, we find that broadly the nature itself has followed a direction, a path of evolution of consciousness to higher and higher level. Thus we may conclude that the natural or "true" path is the one which evolves consciousness to a higher level. We can then say that every action which enhances the consciousness to a higher level is *"dharma"* and any step which goes in the reverse direction, i.e. reduces the level of consciousness is "*adharma*".

Jainism classifies species in one sensed (touch) to five sensed (touch, smell, taste, hearing and vision) species. Nature seems to have started with one sensed organisms and slowly evolved in to five sensed organisms. Extrapolating this trend into the future, it can be predicted that the level of consciousness will develop further with time and a super human will no doubt arise. Jainism prescribes a methodology to attain higher level of consciousness, evolution to the next stage, if nature continues to tread this evolutionary path. This stage will be accompanied by higher level of *jnān*.

Study of the fossil record in sediments has taught us many other aspects of evolution.The main features are summarized below.

1. As already mentioned, evolution of consciousness has been the path taken by nature: from single cell to multi-cellular, to more complex marine species and ultimately

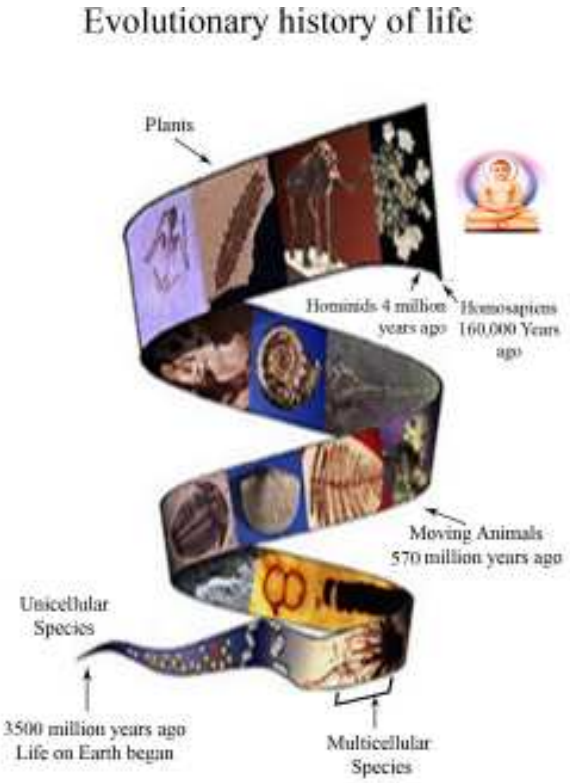

Fig 1.1. The evolutionary record of species on Earth, beginning with single celled species to multi celled species, to marine species, mobile animals, plants, mammals and flying species to humans. Predecessors of Humans (Hominids) first appeared on the Earth about 6 million years ago, rapidly evolving in to Man (*Homosapien*) who first appeared about 200000 years ago.

to mammals and to humans via a detour through plants etc describes the direction of this evolution. Plants adopted a direct process of getting energy from the environment through inorganic processes (photosynthesis) whereas other species found a way of getting energy through organic material, for example, food.

The fossil record also tells us that although physical evolution occurs gradually, consciousness occasionally makes a big jump.In the history of life on earth, four revolutions have occurred. The first was the origin of life, about which we know little. The most primitive, for example monocellular species like algae (prokaryotes), remained completely dependent on environment for their survival and natural transmutation for evolution. Then came higher level of species which proactively interacted with the

environment and modified themselves by interaction. The second big revolution came when species acquired mobility with the onset of Phanerozoic era. This occurred about 550 million years ago. The third revolution is the appearance of mammals. The last revolution is the appearance of humans who can consciously evolve by will and can even change the environment. This started only about 6 million years ago with appearance of hominin genus, ardipithecus and man, as we know today, i.e. *homosapiens* appeared only about 200,000 years ago. Thus we see that the development of consciousness over the geologic times is going on at an ever accelerating pace. The next revolution does not seem to be far away and we are already at its doorsteps.

The most primitive species (e.g. algae) had only *mati jnān* and later the higher species (mammals e.g.) developed *sruta jnān*. The humans have discovered laws and developed ways of calculations by which they can acquire a kind of *avadhi jnān* transcending space and time. They can reasonably well estimate what happened in the remote past anywhere in the universe and can well predict the future. The evolution of consciousness thus has been accompanied by evolution of *jnān* to a higher state, i.e. from *mati* to *shruta* to *avadhi* as can be seen from the species existing at various times in this evolutionary chain. Extrapolating this in to the future would imply that further evolution will lead to higher levels of consciousness and *jnān*, with time i.e. to *manahparyāy* and ultimately to *Keval jnān*. There is nothing which remains to be known after one acquires *Keval jnān*. And eventually, every one should become a *kevali*, if nature has its way. Although this is only an extrapolation, considering the logic on which science works, this looks inevitable.

2. The fossil record shows that the evolution is accompanied, not only by development of new species, but extinction of some of the old forms of life. Sooner or later, extinction of all and every species will occur and they will be replaced by new species, i.e. we can say that extinction is the ultimate fate of all species.

3. The higher species may arise not necessarily from the highest existing species but can occur from any level, even much lower. There are instances that a lower species has given rise, by a quantum jump, to a much higher level (from the point of view of consciousness) of species. This implies that we can not predict what species will evolve to the higher level and when and therefore all forms of life must be considered sacred and need to be preserved for achieving higher level of consciousness. Disappearance of even very 'low' ranking species may delay or derail the process of

acquiring higher level by natural selection.

Based on the observation of physical characteristics and their inter relation in several species, Darwin found that they have physically evolved in different ways over time as a consequence of interaction with the environment and concluded that evolution takes place by natural selection and life is a struggle for existence and survival of the fittest. One point is clear from the Darwin's theory that evolution is a product of two processes, which are operating all the time: interaction and adaptation. Both are the traits of soul i.e. consciousness. Adaptation essentially means learning and there is no devolution, i.e. unlearning. Evolution, however, is not confined to physical evolution only; the underlying trend is evolution of consciousness;. Whether mechanical interaction with the environment leads to physical evolution of the brain or consciousness is the motive force which by interaction with matter leads to learning process which in turn raises the consciousness level remains to be determmined by further research at molecular level. Be it as it may, the journey of life on earth has been from a very low level of consciousness in single celled species to the highest level seen currently in humans. Evolution, like *karma* (Chapter 4) has two components*: Sanchit*, the cumulative evolution from the single celled algae to the present human life and *arjit*, that is the extent to which we evolve in the present life. Thus we owe our present state of consciousness, indeed our very existence, not only to "our" past lives or to our parents but to the lives of all the species which have existed till now, alive and dead; extant and extinct. This is the fundamental concept leading immediately to the importance of non-violence. As far as we can extrapolate, the evolutionary trend of consciousness should continue in the future. This then is the path of nature and it has set itself a goal of raising the level of consciousness to ever increasing level.

The question then arises "Can we humans, by some technique, attain the next state, which, in comparison to us, may be considered an enlightened state". It may just only be a step away. According to Jainism, the answer is "Yes, we can". That is Jainism all about. At any point of time, the population has a wide spectrum of consciousness levels. A small fraction is highly advanced, at the highest end of consciousness level, most are at the average level and a few are at the lower tail end. The distribution should be similar to the Maxwellian distribution of energy. Those at the highest level are close to the next stage where nature is going to take us in course of time by Darwinian evolution, i.e. they are almost there. They, by practicing the techniques propounded by Jainism (as discussed in chapter 6), and surely by other paths as well, can attain the next level of consciousness.

One important point may be noted here regarding the origin and evolution of life. All species are symmetrical and have binary system (two eyes, two arms, two legs etc). All the life on earth therefore probably has the same root. There are three basic type of species on the earth: Archea, Bacteria and Eucarya and it has been speculated that all plant and animal kingdom has originated from them (Fig. 1.2). In essence all of them have a common root, the Last Universal Common Ancestor, termed LUCA. If this is true, all of them may have the same root as can be seen in the phylogenetic tree of life (Fig. 1.2).

There is another fundamental point to be noted in context of Jainism: Jainism postulates that *jiva* and *pudgala* are separate entities, uncreated (without beginning and end), everlasting, coexisting and interacting, influencing each other yet unrelated.

While *Jiva* or *ātmā* is sentient (conscious), incorporeal, immaterial, formless, weightless, colourless, odourless, eternal, matter is corporeal, non-sentient, non psychical, inert entity. One can not be produced from the other. Modern scientific thought speculates, but has not been able to prove, that life has originated from matter.

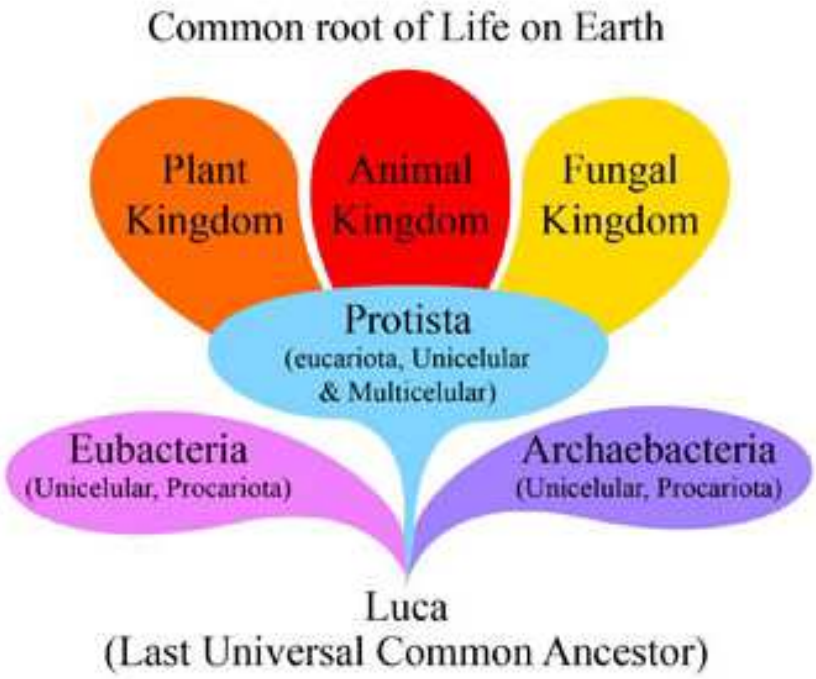

Figure 1.2 : The Phylogenetic Tree indicating common root, [Last Universal Common Ancestor, LUCA] for all plant and animal kingdoms on the earth.

The probability that molecules will assemble in such a way that they will give rise to living species is extremely small, calculated by some scientists to be 10^{-140} . This is too small to result in any organization required even for the simplest species over the life time of the universe. Yet scientists have hypothesized, after a long debate, that there may be favourable conditions, architecture, catalysts and templates by which the molecules can get together fast to form complex large organic molecules and then living organisms and search for such routes from inanimate to animate are continuing. This hypothesis got a big boost by the experiment of Miller and Urey. In these experiments , when an electric discharge was passed in a mixture of simple life forming molecules like carbon di oxide, ammonia, water and methane etc , complex large molecules, like amino acids, proteins and similar building blocks of life were formed in a short time. This experiment however has not resulted in a living organism, howsoever simple and primitive. Although science has shown that matter (having mass M), which is corporeal and inert, can convert in to energy (E) (following the famous law $E=Mc^2$, where c is the velocity of light), which itself is incorporeal and capable of bringing in transformation in to matter and vice versa. It has however not answered the question "how does something as unconscious as matter can give rise to something as immaterial as consciousness". Is life just an aggregation of chemical elements or it is something more? Can assemblage of material components spontaneously produce self conscious ego, aware of itself? In day to day experience we see that only life can give rise to life and it is impossible to produce life from non living matter. We will debate this question further in Chapter 2, but be as it may, let us first consider the universality of the path taken by nature.

Let us begin by debating criteria of a universally acceptable "religion". In terms of the foregoing discussion, the foremost condition is that a universal religion should preserve all species, enable every one to exist, and treat all, lower as well as higher species, as equals, and improve their physical, mental and spiritual well being to enable them to evolve to a higher consciousness state. There are common requirement for accomplishing them, which should be inclusive, and not exclusive, meaning thereby that they should benefit all and not some selected forms of life. The principle for one and all to coexist involves non-violence towards each other; for them to discover their true nature involves search for truth; physical well being requires principle of sharing and equidistribution of resources and not amassing wealth by a selected few. These are the principles of non-violence, truth, (minimizing ones requirements or non-hoarding) and *achorya* (non stealing) as enunciated in Jainism. We can therefore call Jainism a universal religion.

Thus we can see that whether one calls himself a Jain or not , most human beings follow these four principles of Jainism. Besides, these four principles, there is the fifth principle of proper sexual conduct i.e. celibacy or *Brahmacharya*, introduced by Mahāvir in 5th century B.C. , a primary requirement for attaining enlightenment which we will discuss in Chapter 6.

Jainism divides the universe in two distinct parts; living and non-living but gives equal importance to both. Just as physics is the science of the physical universe, Jainism is the science of soul, and more, since it also takes the physical universe into consideration. As any physicists will agree, the universe is governed by certain laws; the laws of physics are universal, applicable at all times and places, can not be violated and there is no scope for miracles. Only when we do not understand a particular phenomena in terms of the known laws of physics, we call it a miracle but the moment the phenomena is explained, the miracle ceases to exist. The same is true of living beings. The science of living beings or soul is more complicated but according to Jainism, it also follows certain laws. When we do not understand these laws fully, we invoke God, but moment the phenomena are understood, the need for a "GOD" disappears. Jainism has propounded these laws applicable to living beings, the soul. These laws, Jainism claims, have been enunciated by the Enlightened souls after they realized the state of omniscience through meditation and other techniques.

According to Jainism, there are six cardinal truths (Chapter 2), applicable to *jiva*s. The *Ajiva* is made of space, matter (*pudgala), dharmāstikāya, adharmāstikāya* and time constituting the physical universe. Although science agrees with existence of space, matter and time, what *dharmāstikāya* and *adharmāstikāya* are remains a mystery and will be debated in Chapter 7. These six entities of the universe are eternal, beginningless, indestructible, fixed in number and except matter, are incorporeal. These eternal entities behave according to laws, are independent of each other, can not influence each other nor can they be influenced by any thing internal or external, nor can they act on their own i.e. they are passive. Their extent in space determines the boundaries of the universe (*Loka*).

Jainism has propounded two basic theories or fundamental principles on which our understanding of the universe and universal processes are based. These are : *Anekāntavād* (multifacedness) and *Karmavād* (causality). Both are equally applicable to physical as well as to the conscious (*Ātma* or Self) universe. *Anekāntavād* describes the true nature of the universe and *Karmavād* describes the basic laws which govern

all the processes in the universe. *Anekāntavād* (Chapter 3) implies that the soul has multiple properties, some even contradictory, and all manifest at the same time. It is therefore beyond logic or description. This is the true nature of soul. *Anekāntavād* does not consider the physical universe as an illusion as some oriental *dharmas* do but accepts it also as real. *Karmavād*, the law applicable to the soul, is equivalent of causality in the physical universe. Every action has a consequence and every effect has an underlying cause. It is the basic law which governs all the processes of *Jiva* (as well as *Ajiva*). It implies that a soul is free to act in any way, i.e. has choice of action , it is the *karta* but is bound by its consequences and can not escape the consequences of its actions, i.e. it is also the *bhokta*. The effects can not be mitigated in any way. The fate is therefore choiceless. *Karmavād* (Chapter 4), besides defining the governing laws for self and interaction of self with matter, in its broader perspective, also includes operative aspects i.e. practices and applications by which one can act in accordance with the law. Because of the practical aspects, it is followed by the Jains rigorously in day to day life. *Anekāntvād*, the theory of non-absolutism, on the other hand is abstract and its basic foundations have not been fully developed. This principle, describing the fundamental nature of matter and *jiva* will be discussed in some detail in Chapter 3.

As mentioned above, Jainism is not a religion in the strict sense. Neither it is matter of faith. Nor it is something which 'God' has communicated to the earthlings, through his incarnations or through prophets for removing the misery of the people. It is something beyond religion and faith- it is a path: a path for common people for attaining enlightenment by their own efforts. It is a difficult path because enormous effort is required to follow it. At the same time it is an easy path because various procedures and landmarks are well defined and the path is clearly charted and one does not have to invent it or depend on some one else for help.

In spite of its originality and antiquity, Jainism is not widely known or accepted. In the eastern philosophy "*Dharma*" (erroneously considered synonymous with religion) actually implies "true nature' or the "path" in contrast to the western philosophy where it is equated to religion or faith. Jainism is an atheist faith, giving equal importance to the physical world and spiritual thought. We make an attempt here to interpret its basic tenets in the modern context. The purpose of every living being is to discover its true nature and find and follow the "path" of increasing his level of consciousness. Every one has to discover and chart this for himself. It depends on his present state and the best mode to achieve the goal depends on individual's personality. The goal of life

is certainly not related to the material well being or economic prosperity only, simply because upon death, which is unavoidable, all the material wealth has to be left here. The material wealth should be a means for achieving higher goals. The only trait which accompanies the soul upon death of physical body is his *karmas* (Chapter 4). Various religions and faiths in this context serve only as examples of various paths or procedures followed by some others who have accomplished the goal of liberation but each of these paths may or may not be suitable for every one. One should study them to discover the path most suitable for him. The aim of every path is to know the truth, and if possible, to realize one's true nature. The fanaticism and conflict arise because the practices each religion prescribes for attaining this goal have to be followed with rigor and without compromise, if they have to be effective. If goals of all the religions are the same, they can not be totally exclusive and there should be some commonality between them. One common factor in today's world, in which everyone has faith, is in the laws discovered by science, since they can not be violated. The methodology of science is truly universal in the sense that any one can study, test and use it. There is no dispute in any one's mind about scientific theories, be they related to electricity, gravity, nuclear physics, chemical combinations or functioning of the body or brain. Therefore it is desirable to make scientific enquiry in to various religions, their basic theories and practices. If some aspects of all religions can be tested and established using scientific methodology, then we can prepare a common ground and live with each other in harmony.

This approach, however, is not without objections and flaws. Many learned persons and Gurus consider science and religions to be exclusive and believe that religion is not amenable to scientific scrutiny. In contrast, Jainism claims itself to be based on science and has given importance to scientific study, although here too the opinions may be divided. Jainism has some well developed theories and practices, some being common to Buddhism and Hinduism. We will therefore discuss some aspects of Jainism in terms of Modern physics in Chapter 7.

The corner stones of Jainism is that every human or living being is born with a purpose or goal and there are procedures to achieve the desired goal. Although every one has to discover the purpose of his life and his status in the spiritual domain (*Guṇsthān*, Chapter 5) by himself and starting from there, chart his path, the ultimate goal is defined as attainment of enlightenment which is the state of "*Mokṣa*" or "nirvana". In this respect Jainism is applicable to all who seek enlightenment, an eternal state of omniscience and bliss. Enlightenment is understanding and "seeing" the ultimate laws

operating in the universe (on both *Jiva* and *Ajiva*). Once these laws are experienced, all ignorance, fear and attachment automatically vanish.The important point to remember is that life is governed by some laws, which can not be violated and does not depend on favour and fear of an almighty "God" . In this respect, the Self is the master and not a slave of his own destiny. He is not helpless but must take responsibility for his own actions.

Jainism is considered as "The eternal religion". What is eternal in this universe, in which everything is subject to change, one may ask. According to the modern scientific view even universe is not eternal. It was born in a Big Bang about 14 billion years ago and it will meet its end in not too distant future. In such a transient universe, only the laws of physics are eternal, physicist believe. They were operative before the universe was born and they will control the fate of the universe, even after it dissolves. In fact the birth of the Universe was a consequence of the laws of physics. Like wise *Karmavād*, the law governing *jiva* is eternal and therefore it is believed that Jainism is eternal.

Any *Dharma*, which claims to be eternal, must therefore be consistent with the laws of physics. What these laws are and how they match with the basic tenets of Jainism, will be discussed in the following chapters but now we turn to the central point of Jainism, the Cardinal Truths in Chapter 2.

2

Cardinal truths (*Shāshvat Satya*)

Appā so paramappā: Bhagvān Mahāvir

Cardinal Truths, nature of soul
Powers of soul, Interaction of Jiva and Ajiva
seven reals,
Types of Ajiva (Space, matter, Dharmāstikāy, Adharmāstikāy, time)

Jainism firmly believes that a human being has infinite potential. All the procedures and theories have been propounded to develop this potential fully. The "cardinal truth" on which Jainism has based its theories is the existence of soul. If soul is a myth, then the pyramid of Jainism is without foundation and can not be sustained. Since the soul is non-physical, one can verify its existence only by its assigned characteristics (nature). Therefore it is necessary to describe its properties. According to Jainism, soul has infinite properties[1]. Jainism takes the approach that every characteristic of *Jiva* or *Ajiva* is a consequence of an inherent power. Therefore, to have infinite characteristics, the soul has to have infinite types of powers. Ten primary powers amongst them are:

(i) *Jivatva shakti:* power to exist for ever i.e. immortality, it is eternal (*shashvat*) (ii) *Chitti shakti* (consciousness) or "*anant chetanya"*, (iii) *Drishti shakti:* soul is an observer or knower, and (iv) *Sarvajna shakti*; power to know everything (*Anant jnān* or omniscience). Six other equally important characteristics of soul are (v) *anant virya* (infinite bio-energy or omnipotence), (vi) *sarva vyāpakatva*, omnipresence (vii) *Anant Ānanda* (pure and infinite Bliss), (viii) *Anekatva* (multi facedness), (ix) *Vibhutva*, all properties (*shaktis*) co-exist in the soul at the same time and (x) *sarva*

1. Samaysar of Kundakunda describes 47 main properties of the soul. See Hukam Chand Bharill's book (47 Shaktiyan, Pandit Todarmal Sarvodaya Trust, Bapunagar, Jaipur).

darshitva, samyag darśan (faculty to have correct perspective of everything, at once). Physics has taught us that a biological system, *jiva*, has the power to extract energy from the surroundings. This is how the entropy of a live process decreases whereas the entropy of a physical process always increases, as will be discussed in Chapter 7. Our nearest source of energy is the earth and the atmosphere and we derive most of our energy from them. The next large source is Sun, stars and the galactic centre. Thus the environmental energy is effectively infinite and therefore the soul is capable of acquiring infinite energy from its environment.

It may be pertinent now to ask the question "Does *ātmā* (soul) really exist? Is there "something" which have any one or all of the characteristics mentioned above. If so, we can prove the existence of *Atma*. Logically, the existence of soul is proved by the very act of doubting its existence. Questioning the existence of soul presupposes the existence of the knower and the knower is the soul, or self, which alone has the capability of knowing, doubting and questioning (consciousness), by definition, as mentioned above. Thus the answer to the question is hidden in the question itself. Soul is thus *swatah siddha*, it is self proven. Descarte famously proclaimed "Cogito Ergo sum", that is "I think therefore I am". Thought exists because self exists. Who is it who is really asking this question about existence of *Atmā*? And who will understand when an answer is given. **That knower is the soul, that is *chaitanya***. Who will know the knower except the knower himself. The *ātmā* is the seer, one who sees. Therefore Bhagvān Mahāvir said "You can know (or see) *ātmā* by *atma*". Sitting in a pitch dark room with eyes closed, one can not see or feel the presence of anything else but there is no difficulty in feeling the presence of the self. One who is aware of one's own self is the *Atma*. The self is endowed with manifestation of consciousness which is two fold, *Darśan* and *jnān*. There is no *jiva* without these two qualities and these two qualities can not exist without *jiva*.

Atma can exist in pure (free of bondage) state or in bonded state. In pure state it has the power of infinite *jnān, darśan,ānand* and potency. These four are called "*Anant Chatuschay*". It is self proven, without beginning (*Anādi*), *Anant* (without end), *amurta* (formless), indestructive (*avināshi*), immeasurably enormous in expanse (*asamkhyāt Pradeshi*) and indivisible (*akhand*). In addition to these properties, ātmā also has some "ordinary" properties like it has existence (*astitva), dravyatva, vastutva, prameyatva, aguru-laghutva, pradeshatva* etc., some of which have been mentioned above. It is the knower, can know without sense organs, i.e. it is supersensuous (*Atindriya),* beyond perception). In pure state *ātmā* is free (unbounded), *nirpeksha,*

swasrit (self supporting), *achal* (motion or vibration less), *nisang* (without company, alone) and *jnāpak jyotimātrā (self illuminating)*. It does not age, is timeless (*akāl*) and so on. The main question is whether Soul is material or non-material, or both or none. Majority of scholars believe the soul in the pure state to be non-material. Einstein has shown that matter, having mass M, can be converted in to energy, E, and vice versa through his famous equation ($E=Mc^{2}$", where c is the velocity of light, the highest speed any physical object can attain in our universe). Thus science has no difficulty in converting non corporeal in to corporeal and vice versa. Whatever be the nature of soul, one thing is clear that because of its power of *Akhandatva* (*akhand, abhed*), it can not be further subdivided in to parts. It is the minutest of the minute and *ati-sukshma*. Expressible or not, material or non material, or having a form yet unknown, Jain scriptures mention that the soul can interact with subtle material particles (*karmānu*). When it does so, it can undergo vibrations. Now as far as we know, only physical entities can have vibrational modes.

Several oriental thoughts believe in existence of soul but their views are not identical. It ought to be so because of the property of *Anekatva* (multifacedness). According to *Saptabhangi* (the theory of seven modes of existence) a theory propounded by Jains (to be described later in Chapter 3), some things are indescribable and may exist in multiple forms at the same time. Accordingly we can say, (i) it is material, (ii) it is non-material, (iii) it is material but still not expressible (as material), (iv) it is non-material but still not expressible (as non-material) (v) it is both material and non-material, (vi) none, neither material, nor non-material and (vii) it is non-expressible. This concept agrees with the modern physics concepts of quantum mechanics in which elementary particles, the ultimate constituents of matter may occur as particles or waves or both. *Saptabhangi* has been explained by D.S. Kothari in a quantum mechanical way by taking the example of a particle in a box which is divided by a partition with a hole in two compartments (A and B). Because of the particle-wave duality, the particle (say, a photon or electron) can be in compartment A, or in compartment B, In A and still not only in A , In B and still not only in B, not in A and B but elsewhere outside the box, in A as well as in B and in an indeterminate state (*avyakta*). The same solutions emerge from the considerations of quantum mechanics as has been shown mathematically by taking wave functions. Following these considerations, we may therefore take the view here that the soul may be both, material and non-material or neither or indescribable.

Many qualities are ascribed to *ātmā* in Jain and Hindu scriptures. In Buddhism, there is much controversy on the existence of soul and The Buddha had forbidden this

question to be raised, because of its indescribable nature. In spite of the elaborate discussion given above, the nature of the soul is a highly debatable point. Materialists and spiritualists, each recognizes only one reality. Scientists hypothesise that "living" can emerge out of non-living, whereas some spiritualists believe that all matter is a manifestation of self (*ātmā*). It is however not clear how either of these claims can be verified. To resolve this dilemma, some dualistic theories were proposed. They consider mind and matter or *Purush* and *Prakriti* as two eternal, coexisting, independent, interacting reals. Even if the two way psycho-physical interaction between mind and matter – from mental to physical (as in action of body, commanded by a thought) or from physical to mental (as in perception) occur, how can our abstract, internal thoughts and intentions about action cause the physical motion of our bodies without the presence of **self** everywhere within the whole body and confined to the body, a property ascribed to self, called *niyatpradeshatva shakti*.

According to Jainism, the universe is an interplay between *Jiva* and *Ajiva*. The soul and *karmānu* interact with each other without loosing their essential qualities. Jainism is clear that *jiva* can not be converted into Ajiva and vice versa, a quality known as "*agurulaghutva*" which maintains them as they are and prohibits conversion from one to another although they can interact and fuse with one another. Jains consider both matter and *jiva* as *astikāya*. Both are real (sat: *"Utpād- vyaya- dhruvya- yuktam sat"*). Every action by *jiva* results in a psycho-physical entity called *Karman sharira*. In bonded state, it acquires vibration (*spandan yukta*)".

J*iva*, like matter, is *asthikāya*, but unlike matter that offers resistance to other material particles entering the space which is already occupied by another matter, soul occupies the dimension of the body but does not offer any resistance to other souls to enter it i.e. *ātmā* does not fill the space which it occupies. Two or more souls can occupy the same space just like two lamps can illuminate the same area. Thus co-existence and co-presence are qualities of the souls. Of the various qualities of the soul mentioned in Samaysar, one is *Vibhav shakti*: i.e. power of distortion which makes soul and matter liable to mutual influence. Both soul and matter interact with each other without loosing their own essential qualities. This is the primary power under the influence of which *ātmā* interacts with *karmānu* and both evolve in their own way. This interaction leads to bondage. There is no bondage without interaction between *ātmā* and *Karmānu* (material particles) and there is no interaction without bondage. There are two types of bondages: *Bhāv karma* and *dravya karma*. *Bhāv karma* is the transformation of self through itself and *dravya karma* is transformation of self

through physical action.

Once the existence of soul and its eternal nature is accepted, four additional cardinal truths of Jainism, making them six in all, can be enunciated as follows[1].

The Eternal Truths:

1. Soul is the *Kartā* (doer): soul's indulgence in *Karma*.
2. Soul is *Bhoktā*: Soul has to bear the consequence of *Karma*.
3. Existence of *Mokṣa* : The soul can attain pure state, free of bondage.
4. Procedure of attaining *Mokṣa:* There are ways of purifying the soul.

When one believes in the six cardinal truths[1], mentioned above, one attains correct perception or world view (*Samyag Darṣan*), which leads to true knowledge (*Samyag jnān*) and perfect conduct (S*amyag Charitra*). Every jiva has a different world view, controlled by its *karma* vision. What we see is what the karmic vision allows us to see through our sense organs. Sense organs have their limitations and defects.That is the reason animals and humans percieve the world differently. Even among humans, different persons have different views, based on efficiency of their sense organs, mental capacity and karma vision. This is due to ignorance. When all the *karmas* have been dissolved we get the correct "View". It is through dissolution of conceptual or "perceiving mind" that the "enlightened mind" is explicitly revealed. Piercing the ignorance with correct vision (*samyag Darṣan*) leads one to *samyag jnān* and imbibing this jnān in one's activities leads to enlightenment.

The Universe consists of seven (and only seven) reals (*tattvas*). These tattvas are : *jiva*, *Ajiva*, *Asrav* (inflow of karmānus), *bandh* (bondage of soul with karma), *Sanwar* (Stoppage), *Nirjara* (detaching) and *Mokṣa* (liberation). Basically the last five elements are related to interaction (association and dissociation) of *Jiva*, the sentient (Soul) with material *karmānus*. *Jiva* is an active element, capable of acting on its own (*karta*), having various powers listed above. *Ajiva*, as mentioned before, is considered as an independent element made of five elements of *Dharmāstikāya* (considered as medium of motion), *Adharmāstikāya* (medium of rest), space, matter

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1. This discussion is based on Atmasiddhi of Srimad Rajchandra (*Drstivad),* according to which there are six cardinal truths: Soul exists, soul is eternal, soul is the *Karta,* soul is the *Bhokta*, *Mokṣa* exists and there are ways of attaining it

and time. These five elements, which are passive (can not act on their own), independent, all pervading, coexisting, indestructible, not capable of influencing each other, according to Jainism constitute the physical universe.

Interaction of soul and matter is the most vital aspect of Jainism. This interaction, both association and dissociation occurs through *karmānus*, the subtle particles of matter. When soul acquires *karma,* a body begins to form. Five layers of bodies manifest for every *jiva*: *karmana , taijas and audārika exist normally and ahāraka* and *Vaikriya* exist under specific situations. These are translated, respectively, as *karman* body, energy body, physical body, translocation body and transformation body. As the soul acquires *karmānus, karman* body is formed and when the soul sheds all the *karmānus*, it acquires the pure state. The *karman sharira* is receptacle for *karman* matter and changes every moment as the *karmānus* are assimilated or shed. At the time of death, this *karman* body accompanies the soul and forms the basis of a new body which may be acquired on rebirth (see Chapter 11). The *taijas* body consists of energy (energy *pudgals*) and helps in metabolism. *Ahāraka* body is the conscious body which strives to attain clarity of the basic philosophy of life, and in the process acquires *jnān*. It is kind of consciousness *(chetanā)*. *Vaikriya* body enables the body to change its form and dimension and thus can bring about transmigration of soul to different bodies. *Audārika* body is the physical body of animals and humans as we possess. To summarise, every living being possesses five bodies, which in order of subtle to gross forms are : *karman* (causal), *tejas* (energy), ā*hāraka* (conscious), *vaikriya* (multi-shape) and *audārika* (physical).

We have seen in this chapter the basic elements of Jainism and some aspects of interaction between *Jiva* and *Ajiva*. Now we will discuss the basic nature of the universe as described by *Anekāntavād* and the basic law of *Karmavād,* which governs interactions of soul and matter in the following chapters.

3

Anekāntavād

One is many and many is one

Nature of the universe,
Macro and micro world,
Syādvād, Saptabhangi

Jainism has given a unique concept of nature which is not found in any other thought. It is a deep conceptual doctrine, called *Anekāntavād*, stating that the nature is multidimensional, multifaceted, having infinite modes of manifestation, all existing at once i.e. at the same time. Everything we think, see or imagine is a manifestation of the same ultimate truth, although on the face of it , some facets may even appear mutually contradictory. It is not merely a doctrine but it is also a physical reality, a true and complete description of nature, unlike the sciences which give an incomplete or partial description, depending on what is being observed. It also has application in day to day life for harmony and understanding at personal, societal, national and spiritual levels. Much has been said in praise of *Anekāntavād.* Understanding of *Anekāntavād* is essential for getting correct world view or *Samyagdarṣan.* Samyasar, one of the holiest scriptures of Jains, goes to the extent of saying that one who is equipped with anekānta attains *Mokṣa*,

"Any real object in the world is existent and non existent (*sat and asat*), one and many, eternal and non-eternal (*nitya and anitya*), describable and indescribable (*abhilāpya and anabhilāpya*), neither this nor that, but both i.e. this as well as that in terms of its nature, time, *pradesh* (space) and material (*swaroop, kāl, kshetra, dravya and bhāv*)"[1].

This is how Amritchandra described *Anekāntavād.* One may see a thing from any stand point (*naya*) and there are several *nayas* such as *naigam naya* (end use), *samagra naya* (universal or general view), *vyavahār naya* (practical view), rajusthra naya (current view), *shabd naya* (synonymous view), *samviruddha naya* (etymological view) and *avambhoot naya* (simily view) etc. When these *naya* propositions or

standpoints are formulated in an absolute way (this is it) and are claimed to be absolutely true, they become fallacies. Therefore each standpoint should be considered as only partial truth and is true only in relation to the context.

This theory of *Anekāntavād* has been variously described as the theory of many-foldedness, non absolutism, non equivocality and relativism. S. Mookerji calls it multifacedness and the theory of non-one sidedness, implying the many sided nature of reality. Some times *Anekāntavād* is contrasted with *Ekāntavād* which stands for definite and categorical asserted philosophical position, which as pointed out earlier would be wrong or partially true. In the physical world, as in philosophy, things or ideas have plurality of attributes and these can be apparently contradictory or conflicting. *Anekāntavād* successfully harmonises or accommodates such views and completes the description of the physical reality.

To understand this principle, let us turn to quantum mechanics. Physics divides the universe in two parts, the macro or gross and the micro or subtle (see Fig.7.1). The laws governing the macro world (galaxies, planets, rocks and whatever can be seen with eye, i.e. bigger than molecules and atoms) follow the laws of classical physics and the laws governing micro world (molecules, atoms, elementary particles etc that can not be seen with naked eye) are governed by quantum physics. The laws of classical and quantum mechanics are very different and will be discussed in some detail in Chapter 7 in a broader context of Jainism and modern physics. Here we confine to a scientific discussion relevant to *Anekāntavād*.

We see that gross matter has only a few properties. Anything we see has only two physical properties: weight and shape. As we go to smaller entities of matter constituting the microworld, like protons or electrons, they exhibit additional properties, like electric charge, wave – particle duality etc. The essence of this discussion is that in the domain of elementary particles, as one goes to finer and finer constituents of matter (from molecules to atoms to protons to quarks and so on), it exhibits more and more attributes (quantum states). It is difficult to perceive all of them at once, although they exist all the time. This is the true nature of reality. It is not possible to comprehend or quantify all these states at once. As we go further to the smallest particle, according to Jainism, the dimensionless *paramanu*, it may have infinite attributes, impossible to comprehend. This is not a limitation of instrument or technique of measurement, nor it is a limitation of consciousness of the observer, but it is due to the inherent nature of *paramanu*. It is possible that, for example, just as at atomic level wave–particle duality begins to manifest, at *paramanu* some new attributes of matter would arise. Energy also has many forms

like heat, light, sound, kinetic, potential, nuclear etc. These seemingly contradictory attributes (wave-particle, energy-matter) may be the basic nature of matter. But Jainism does not permit mind-matter or consciousness-matter duality, that is these two contradictory attributes are not the manifestation of the same "real". What then is matter? Logically we can argue that matter is a condensed form of light and light is a sublime form of matter. Light is energy and energy is an attribute of the soul, even so soul-matter duality is not acceptable to jainism. According to Jainism, consciousness and matter i.e. sentient and non-sentient (*Jiva* and *Ajiva*) are independent, exclusive and eternal. Understanding the nature of the universe requires that we consider each of the attributes of matter as well as of consciousness to be partly true and all of the attributes have to be considered at once for a complete description.

Let us talk about the principle of Complementarity, a cornerstone of modern physics and *Anekāntavād*. The principle of Complementarity, is the most revolutionary and significant concepts of modern physics. Neils Bohr who propounded the basic principles of quantum mechanics had great difficulty explaining it and he used the principle of Complementarity to explain certain behavior in the microworld. For example, it can be experimentally shown that a photon (or electron) sometimes behaves as a compact particle and sometimes as a wave such as a ripple we see in a pond. A photon or an electron, for example, "knows" when it should behave like a particle and when it should behave like a wave. In the famous two slit experiment (see Fig. 7.2), a beam of photon shines through two slits and hits upon a photographic plate behind the slits. The experiment can be run in two ways: one with photon detectors right beside each slit so that the photons can be observed as they pass through the slits and/ or with the detectors removed, so that the photons can travel unobserved. When the detectors are in use, every photon is observed to pass through one slit or the other. Essentially the photons behave like particles. However, when the photon detectors are removed, a pattern of alternating light and dark spots, produced by interference of light are observed indicating that the photons behave like waves, with individual photon spreading out and surging against both the slits at once. The outcome of the experiment then depends on what the scientists want to observe, particle or wave nature of light.

This dual behavior seems contradictory and western thinkers had lot of difficulty in explaining this seemingly contradictory nature of particles. Either it should be a material particle or a wave but can not be both. Bohr explained this behavior by saying that contradictory behaviour is complementary and used the Chinese concept of Yin and Yang, which are both opposite but exist together and are required for complete

description.

Anekāntavād goes a step further. *Anekāntavād* implies many foldedness . The question arises how many? Certainly more than one, but could it be infinite? It is not just two types of behavior (particle and wave nature of elementary particles) which needs to be explained but many (*anek*) or even infinite types of behaviour, manifested probably when we go down further to more subtle, smaller constituents of matter. As we have seen in the previous chapter, the soul is indivisible (*akhand*) and hence the minutest of everything that exists in the universe.

Anekāntavād not only explains seemingly contradictory propositions in daily life, philosophy, microworld, mental perception and in spiritual domain, but it brought in the concept of *Avyakta* or inexpressibility of certain states. Science has been developed on the basis that everything is logical and expressible and does not believe in inexpressibility of any characteristics. Questions which can not be answered in affirmative or negative, like the existence of soul, could be dealt with in the framework of *Anekāntavād*. *Anekāntavād* is not simply a multiview perception theory. Neither it is a limitation of consciousness that it has limited capability of perception of the physical world but it is the true behavior of nature. Thus it is not looking at an object from different perspectives but implies that the object can not be known from all the perspectives, at once.

Syādvād, a corollary of *Anekānatavād*, is a cornerstone of Jainism. Syadvad asserts that all answers are contextual and we may be nearer the truth when we say that" this too may be correct". It does not mean uncertainty but makes our understanding as certain and complete as it can be. *Saptabhangi* or sevenfoldedness is a corollary of *Syādvād*. Every answer should have seven possibilities. For anything, it is , it is not; it is and yet it is not, it is inexpressible (or indeterminable), its existence is indeterminable, its non-existence is indeterminable, its existence as well as non-existence is indeterminable are the seven possibilities. This concept is common to Quantum behaviour, which can not always be expressed in language. This has been explained by D.S. Kothari in his essay on " Complementarity principle and Eastern philosophy".

In a nut shell, *Anekāntvād* asserts that "this is true and that also is true". Contrast it to upanishadik concept of *neti*. When asked what "God" is, the Upanishads, pointing at everything conceivable, says **"Neti , Neti" neither this, nor that.** None of the visible objects is God. In contrast *Anekāntavād* says **This is partly true and That also is true.**

Three different doctrines have been proposed in various eastern thoughts: *Advaitavād* (non-duality or monism), *Dvaitavād* (duality) and *Anekāntavād* (infinite possibilities).The universe consists of infinite type of things. The first proposition is that every thing we see has emerged from one. Thus *Advaitavād* asserts that everything is a manifestation of "One". If in the beginning there was only "ONE", logically "many" (*anek*) can not originate from "one" (*Ek*) because, nothing happens by itself. Without a cause, "ONE" would exist as it is for ever. For anything to happen to ONE, requires an outside agency. Existence of a cause, thus, requires something external of the ONE (i.e. at least "two"). Causality requires at least two to interact to give rise to "many", so "many" coming out of "one" violates causality. This proposition rejects "*advaitavad*" (non-duality, i.e. monism) and necessitates "*dvaitavād*". In this case every thing emerges from the interaction of *Purush* and *Prakriti*. *Anekāntavād* goes a step further. It asserts that the "ONE" has infinite attributes and thus one and many are the same. It thus synthesizes *Ekantvad* (*advaitavād*), dvaitvad in to *Anekāntavād*. *Anekāntavād* should truly be called *Anantavād* or theory of infinite possibilities. Thus *Anekāntavād* is a correct description of the physical reality and is necessary for understanding the nature of the ultimate constituents of nature.

4

Karmavād (Causality)

One who believes in karma can do no wrong and
can never be unhappy.

Types of karma
Elimination of Karma:
Āṣrava (inflow), Bandh (bondage), Saṁvara (protection), Nirjarā(cleansing), Mokṣa (emancipation)

The physical processes occurring in the universe follow the law of causality "Nothing happens without a cause and every action has an effect". This law of causality, applicable to sentient beings, in the spiritual domain is *Karmavād* of Jainism. In our day to day experience we may find that deeds and destiny are apparently not related, or they are not in conformity with cause and effect relationship, yet Jainism believes that every physical action has a physical effect on the body and mind and every mental action (thought) affects the mind and sometimes also the body. Both physical and mental actions affect the soul, but the consequences of *Bhāv* (thought or attitude) on the soul is dominant. Every action or thought (physical or mental) results in bondage of the soul. A person has the freedom to act in any way he likes but has no choice in facing the consequences of that action because he is bound by the law which can not be violated. What we are now is the cumulative effect of our past karmas (in previous and present life) and what we will be in future will be determined by our karmas accumulated up to this life. Good or bad, both types of actions result in bondage; they can not be annulled by each other i.e. a good act can not cancel the bad act of equal magnitude but one has to go through the consequences of each of them separately.That is, *Karmas* are non-additive. When the bondages due to each, good as well as bad, *karmas* are completely eliminated, one attains *Mokṣa.* Influence of some types of *karmas* can be made milder by certain techniques and their severity can be reduced or postponed whereas there are others, consequences of which have to be experienced in full measure. Liberation from both these types of the binding *karmas* is the goal of the soul. The

inevitability that one has to face the consequences of his actions, sooner or later, will refrain one from wrong-doing, even in trivial measure, and the concept that " the unhappy patches in life are a consequences of the past *karmas*, which can not be avoided or erased" will provide him the necessary strength of facing them without suffering. The lack of causal relationship between *karma* and its immediate consequences in the current life is explained by eternity of soul, rebirth and fructification of *karma* at some later, appropriate time.

The stage or *Guṇsthān* at which the soul is located depends only on bondage of one's accumulated *karmas*. Souls take birth at appropriate stage determined by the *karmas* of the previous births. Upon death, the soul leaves the physical body, leaving all the physical objects of desire here on earth but carries with it the *karmas*, past and present.

It immediately follows that no one, not even "God", if He existed, can help one from going through the consequences of his *karma* or actions.

In this world, one can not exist without acting in some way or the other all the time. So that the key to *Mokṣa* is to act without acquiring *karma*. It does not mean that one should not act but how to act so that there is no bondage? One should act without passion, attachment, expectation, but not without purpose of achieving *Mokṣa*. The path or procedure accomplishing this goal is via *saṁvara* (stopping to acquire new *karmas*), and *nirjarā* (shedding old *karmas*).

Karmas have consequences, at physical, mental, and consciousness level and binds the soul to its actions. *Karmas* are cumulative. Surprisingly, they do not fructify instantaneously but there is a period of dormancy before they arise. This explains the apparently different fate for different persons which seems unrelated to their deeds and efforts in the present life.

There are infinite types of *Karmas* but they can be classified in a few groups, mainly eight. Of these four are destructive (*Ghāti karmas*) and the other four are non-destructive (*Aghāti*), as mentioned below, but the soul carries all of them with it at birth. *Ghāti karmas* affect the soul and subdue its purity whereas *Aghāti karmas* only affect the physical environment and worldly traits of a living being.These form two repositories, *sanchit karma* and *arjit karma*. *Sanchit karma* are accumulated over previous lives or past and *Arjit karma* are acquired by actions in the current life. *Karma* can arise when the time is ripe; in the meanwhile it remains dormant, but does not cease to exist. Why the consequence of *karmas* is not instantaneous? Why they

remain dormant for variable periods? It is because the consequences of *karmas* are not allowed to be faced in an approximate manner. Therefore one has to wait till the physical conditions or situations are suitable and are precise for *karmas* (*nām karma, gotra karma* etc) to satisfy with exactitude before the consequences of other karmas can fructify? A million combinations are required for the *karmas* to arise so that the consequences could precisely match them. Science of karma is an exact science. Its fructification then is a statistical phenomena, waiting in search for the right combination. Some times the conditions can be met immediately and suitable results may be quick to follow whereas in other case it may take time for exact conditions to be met and the consequences may be much delayed.

The various important group of *karmas* are as follows:

1. ***Jñānāvarṇîya*** (Wisdom deluding) *karma*: The most serious is the *jnānavarṇiya* karma as it blurs the acquisition of true knowledge, which is the basis of *Mokṣa*. Once one is convinced that the life has the purpose of attaining *Mokṣa*, search of truth is the only way and all the souls (*jiva*) are entangled, then one follows the path of Ahimsa (non-violence) in thought, speech and deed and acquires *manah paryāy* and *Keval jñān*. *Keval Jñān* is omniscience or *anant jñān*, a state when one knows everything, in past,present and future, not through sensory organs but in a supersensuous way.

2. ***Darṣanāvarṇîya*** (perception deluding) *karma*: It blurs the acquisition of correct perception through sensory organs and mind as also the extrasensory perception. Once one perceives the existence of soul and the six cardinal truths (Chapter 2) and has full faith in laws of *karma*, this delusion ends and one acquires *samyak Darṣan*. Understanding *Anekāntavād* (chapter 3) is essential for attaining *samyak Darṣan*.

3. ***Vednîya karma*:** It determines the potential for suffering pain or pleasure. When one has mastered the mind to remain calm and detached to worldly events then this *karma* is eliminated.

4. ***Mohanîya karma***: This *karma* is acquired due to attachment with the worldly possessions and pleasures through *māyā* (physical attachment), *krodha* (anger), *mada* (pride, ego) and *lobha* (greed, possessions). It can be called *charitravarṇîya karma*, which inhibits just and proper conduct. When one has mastered total detachment and follows the path of total forgiveness to all living beings than this

karma is eliminated. In practice, *krodha, māyā, mada* and *lobha* can not be just stopped because mind can not exist in vacuum, and therefore they should be replaced by *Kshamā* (forgiveness), *Saralatā* (simplicity), *vinay* (humility) and *santosh* (contentment) respectively. When this is achieved , the soul is free of passions and *mohaniya karma* is eliminated.

5. ***Ayush karma***: It determines the life span in the new incarnation.

6. ***Nāma* karma**: It determines the personal traits of a *jiva* like body and health.

7. ***Gotra karma*:** It determines the yoni (species), family, social status etc in which a *jiva* will be reborn.

8. ***Antarāya karma***: It determines the various obstacles one faces in accomplishing his goals.

Each of these *karmas* are further sub-divided into many groups, but it will suffice here to say that there are procedures for eliminating various *karmas* as discussed in Chapter 6. Each of these *karmas* are accrued in three ways, by physical action, by thought and by consent (*anumodan*) approving it to be done by others. Therefore one must not only refrain from wrong doing by himself, and not even think of wrong doing but also refrain from approving wrong doing by others. *Karmas* get bound to the soul and make it impure.How do the physical *karmanus* get attached to the non-physical soul? According to some Achāryas (e.g. Abhaydev Suri) the karmic matter (*Karmāṇu*) is fastened to the soul by *leṣyās*. *Leṣyā* is a kind of psychic colouration and is of six types: namely black, blue, grey, fiery, yellow and white.The colour implies gradation from bad (*pāp*) to good (*punya*) types of karma, white representing the highest *punya karma*.

Karma, *Jñān* and *Guṇsthāns* are intimately related. As the bad *karmas* are shed, one moves to higher spiritual stage and acquires higher level of *Jñān*. We will discuss these aspects in the next chapter.

5

Fourteen steps to Enlightenment
Spiritual stages of Soul

See your Ātmā with your Ātmā

Spiritual stages of Soul, *14 Guṇsthāns*

Relation between Guṇsthān, karma and jñān

The journey to *Mokṣa* begins from the present state of an individual and *Siddhahood* is the final state. This road is marked by 14 milestones, called *Guṇsthāns*. These 14 stages of elevation to higher levels of consciousness, which are analogous to energy levels of elementary particles predicted by quantum physics in the physical universe, are like rungs of a ladder. Transition from some stages to stages below or above are allowed whereas some transitions are forbidden. The ascendency depends on following the path of purification, outlined later, in Chapter 6. The final goal is to attain *kevalîhood* (stage 13), after which one becomes a *Siddha (stage 14)*. Each stage has a "name", signifying the quality of attainment which are discussed in great detail in various *Karma granths*.

Before we describe each milestone, it may be appropriate to introduce some important landmarks on this journey to enlightenment, that is the stages 2, 4, 7 and 14, which is the final destination. Briefly, the base line of the ladder or the first stage is *Mithyātva*, where a soul possesses wrong perception or a state of total delusion. A person who does not believe in the cardinal truths (existence and purification of soul), outlined in Chapter 2, is a deluded soul and is at stage 1 and there is no hope for him till he gets the correct perception. Faith in the cardinal truths leads to ascendancy on this ladder of states. Ascendency to higher states depend on removal of various delusions or *Karma*, discussed in Chapter 4. A *mumuksha* (seeker) strives for the qualities of compassion, tranquility, equanimity, forgiveness, truth, renouncement and detachment,

which are ever present in the mind but have to be practiced or transalated in to action.

The perception related delusion is overcome in the fourth stage when a person gains right perception (*samyakatva*). As the aspirant goes ahead in thought and action (*Jnān* and *Charitra*), the perception gets clearer and thereby the character related delusion also continues to decrease and exists only at trace level at stage 7. Eventually, when the traces also disappear, the aspirant attains 8th stage. Thereafter the progress in overcoming delusion is swift. When the character related delusion is totally overcome one reaches stage 12. The rest of the defiling *Karmas* are instantly destroyed and the person attains omniscience, which is designated as stage 13. At this stage, one attains infinite knowledge, infinite perception and infinite bliss etc. Enlightenment arises when the delusion is totally overcome. This does not mean end of the embodiment but at this stage, the person becomes indifferent to physical aspects and remains transcendental. When the omniscient ends the current life, it gives up the body and becomes a liberated soul, the *Siddha*.

Within these stages, there can be upward or downward movements. In case of *jiva* this highest energy state is the most stable state from where one does not go to the other lower states in contrast to the physical universe where the lowest energy state (called the ground state) is the most stable (Chapter 7) .

Now we discuss each of the fourteen *Guṇsthāns* in some detail.The path begins with realisation of correct perception (faith in the six cardinal truths) and follows the route through correct conduct, purity of thought, destruction of all *karmas* and annihilation of gross as well as subtle passions, as mentioned below.

1. *Mithyātva* (belief in wrong faith)

Mithyātva means false perception or wrong world view. Right faith means faith in the cardinal truths, i.e. existence of soul and *Mokṣa* as mentioned in Chapter 2. A person having wrong faith does not relish the religion of the soul, which requires right faith, right knowledge and right conduct. Therefore there is no hope of salvation for him.

This wrong faith can either be " inherited" or "adopted". The sense of oneness of soul with inanimate objects like physical bodies and worldly belongings is called the inherited wrong faith. In presence of such a belief, a person remains engrossed in worldly pleasures and can not comprehend the true nature of things, leading to "adopted wrong faith".

2. *Sasādan Samyakatva* (belief in right faith)

A person having the right faith, that is belief in the cardinal truths (i.e. *samyagdristi*) is in stage 2.This is beginning point of his journey to enlightenment. After ascending to higher states, for example stage 4, one can sometimes, howsoever briefly, have doubt in the cardinal truths under the influence of *anantānubandhi* passion, afflicted by wrong faith (called *Asādan*), and will fall back to the transitory stage 2. From there he may go down to stage 1 or rise to stage 3.

3. *Misra* (Unstable state)

This is a confused state. The mind keeps on oscillating betwen right and wrong perception. Even when a person has acquired the right faith, some times he may be hesitant or doubtful about the veracity of the cardinal truths, required in the fruition of *Samyakmithyatva Prakriti*, is at this *Gunasthān*.

From this *Gunasthān* a being does not go directly to higher stages like *Deshvirat* (stage 5) or *Apramatta Sanyat Gunasthān* (stage 7) and does not bother about bondage of age, death and *Marnāntik Samudghāt*.

4. *Avirat Samyagdrishti* (Correct faith but imperfect conduct)

The state of the soul with unwavering right faith (in the six cardinal truths) but devoid of rigorous observance of rules of conduct (i.e., *Aṇuvrats* and *Mahāvrats*) is the fourth stage named *Avirat Samyakatva*.

A person with right faith and observing right conduct, by realizing the true intrinsic nature of soul and with spiritual experience attains the fourth stage. He realises that he is the sentient supreme being and is the knower, the rest of the universe being the "known", and that he does not have any relationship with the *ajiva* (non-self, e.g. his body) entities. The worldly manifestations of the soul are not its true nature; they disappear with the correct vision of the nature of the self. This vision, following the elimination of the *Anantānubandh*i passions, leads to the blissful and detached state of being and the purity of the soul persists.

At this stage, due to rise of the *karmas*, the souls are of three kinds : (i) *Aupshamik*, where the passions exist but they are suppressed or dormant (ii) *Kshayopshamic*, where the passions are eliminated as they arise and (iii) *Kshayik*, when the passions

are totally eliminated. In any of these, the person becomes indifferent to the sensual pleasures although he does not observe total *ahimsa*, i.e. injury to moving and non moving *jiva*s. He does not refrain from all the undesirable activities (12 kinds of abstinence). As long as this being follows non-abstinence on account of fruition of *Apratyākhyānavaran* passion, pride, deceit or greed, he stays in this 4th stage.

5. *Deshvirat* (Observance of non-violence)

The aspirant in the fourth stage further develops the purity of soul by abstaining from killing or injuring moving creatures but he does not abstain from killing or injuring non-moving creatures (e.g.vegetables) attains the fifth stage.As the *Apratyākhyānavaran* passion is eliminated, the experience of true nature of soul becomes more frequent than in the fourth stage. The soul develops tranquility and higher degree of peace and he becomes indifferent towards non-self entities and develops merits of *Deshvirat*. This is also called *Vratavirat* or *Sanyatasanyat Guṇasthān*, for internally he follows real abstinence of the *Sanyamasanyam* stage and follows various *Aṇuvrats*.

6. *Pramatta Sanyat* (Right conduct)

The sentient aspirant eliminates twelve passions and attains *samyak Charitra* i.e. conducts himself perfectly. This is called the sixth stage of *Pramatta Sanyat Guṇasthān*. Still in this stage, there exists *Sanjwalan* passion with usual force and unthoughtful behaviour.

Usually a seeker lives like a *sādhu* in this stage and follows the twenty-eight primary and their associated rules. These include five *mahāvrats*, five *samities*, six Essentials, five sense controls, uprooting of hair, non-bathing, sleeping on ground etc. Although the internal purity is retained and observed, the feelings of attachment stays in some form.

A person can be involved in unthoughtful behaviour (*charitra*) in many ways; eighty such behaviours are mentioned in the scriptures but the main fifteen unthoughtful behaviours amongst them are unhealthy narration of women, food, nation and guru, four passions of anger, pride, deceit and greed, behaviour of five senses, sleep and love. Though such a behaviour attract impurities, it does not destroy the abstinence acquired for attaining the sixth *Guṇasthān*.

Process of thought with necessary purity of operation is essential in the sixth stage, while the seventh *Guṇasthān* is spontaneously attained without the process of thinking.

As such the seeker may remain in that stage for very long time oscillating between the sixth and the seventh stages. One noteworthy fact is that the seeker has to first experience the seventh *Guṇasthān* even though he later on descends to the sixth.

7. *Apramatta Sanyat* (Right conduct with subdued passions)

The real seeker without the fifteen undesirable behaviours (*Charitra*), mentioned above, attain the *Apramatta Guṇasthān*. The twelve passions are extremely subdued, while *Sanjwalan* passions exists in a mild form. The undesirable behavior does not generate any impurities and the primary and secondary rules of conduct lead to this stage of *Apramatta* Sanyat. Knowingly there is no thought process other than meditation of the pure soul and its experiences. This state continues in all the further *Guṇasthān*s. This *Guṇasthān* has two kinds (i) *Swasthan Apramatta Sanyat*, (ii) *Satishaya Apramatta Sanyat*.

Those in this stage who do not ascend to the *Kshapak Shreni* or the *Upsham Shreni* and alternate between the *Pramatta* and *Apramatta* states are called *Swasthān Apramatta Sanyat*. The seekers having developed special unity with the self attain further purity and are called *Satishaya Apramatta Sanyat*. From this stage the path is straight forward. As they apply all their spiritual might and develop oneness with the soul, they progressively attain higher *Guṇasthān*s, destroying the twenty one *Prakrities* of *Charitra Mohaniya* karma, after which they definitely obtain omniscience (thirteenth *Guṇasthān*). If their effort is not complete and only succeed in subsiding (rather than destroying) the twenty-one *prakrities*, they progressively attain eighth, ninth, tenth and eleventh *Guṇasthāns*.

8. *Apuravakaran* (Purity of thought)

The soul attains an unprecedented (*apurva*) state of purity in this *Guṇsthān* and continuously retains it. Various souls undergo different types of transformation in this stage, which is somewhat subjective. Souls ascending on the *Upsham Shreni* as well as the *Kshapak Shreni* undergo the same form of transformation.

9. *Anivrittikaran* (Destruction of gross passions and most Karmas)

Each soul undergoes transformation required to attain infinite purity, but the magnitude of modification required may vary for different souls. The soul at this stage by the strength of contemplation subsides the twenty *Prakrities* of *Mohaniya karma* and the thirteen of the *Nāmkarma*. Souls of persons in this *Guṇasthān* do not return to the previous state and do not further attract *karmic* matter for future births.

10. *Sukshma Samprāya* (State of purity with subtle passions)

In spite of the purity, minor greed still persists, intentionally or unintentionally. The greed of attaining *Mokṣa* is the most difficult to overcome, because that is actually the motive force for the journey to enlightenment. Those who have their sukshma *karmas* either subsided or destroyed are said to be in the *Sukshama Samprāy Guṇasthān*.

11. Upashānt Kashāy (State of mild passions)

The person in this *Guṇasthān* has subsided all external and internal passions. Out of the four destructive *karmas*, the *Mohaniya* is in the *Upashānt* state while the other three have the *Kshayopasham* state. Since the soul has complete detachment with imperfect sentience, this stage is also called *Upshānt Kashāy Veetrāg Chhadmastha Gunasthān*.

12. *Kshina Kashāy* (Annihilation of all passions)

The souls that have annihilated all passions and attained perfect detachment with complete elimination of all the *karmas* occupy this *Guṇasthān* named *Kshina Kashāy*. Since there is yet some minor imperfection in sentience, though complete detachment has been attained, this *Gunasthān* is called *Kshina Kashay Veetrāg Chhadmastha*. The saints following the perfect conduct in this stage have annihilated the *Mohaniya Karma* altogether and the remaining three destructive *karmas* are at *Kshayopshama* stage. As soon as these three *karmas* are destroyed, they will attain the thirteenth *Gunasthan*.

13. Sayog *Kevali Jin* (Enlightened souls, Enlightened preachers)

The souls have achieved the nine accomplishments (*Kshayik* right faith, conduct, consciousness, perception, charity, gain, *Bhog, Upbhog* and vitality) and have become *Kevalies*. They become super-sensuous.Now their sentience does not require senses to observe or light to see. Since their mind, speech and body is still operating, they are *Sayog* and since they have conquered both the psychic and material *karmas* they are called the *Jins* and their *Guṇasthān* is called, Sayog *Kevali Jin*. These *Kevalis* enlighten the path of emancipation for others by their divine discourses on the path of liberation of the soul. Influx of *Sata Vedniya karma* due to mental thinking, bodily movement and speech does not convert to bondage due to the complete absence of passions.

14. *Ayog Kevali Jin* (Liberated souls)

The *Kevalis* in this *Gunasthān* are without any activity of mind, speech and body and have attained omniscience. Therefore, this *Gunasthān* is called *Ayog keva*li *Jin*. In this stage the *Kevalis* destroy all the *Prakrities* of the *Aghāti Karmas*, responsible for their rebirth, and attain *Siddhāhood*.

Siddha Parmeshti

Those who have journeyed through the fourteen *Gunasthan*s of the worldly existence, become bereft of all the eight psychic and the conventional *karmas* (Chapter 4) and enjoy the state of eternal bliss. They attain the eight great attributes (*Samaykatva, Anant jnān, Anant Darṣan, Anant Virya, Sukshamatva, Awagahanatva, Agurulaghutva, and Avayabādhatva)* due to the destruction of all the *karmas*. Being bereft of any psychic, conventional or matter *karmas*, their soul would not assume new form of life, i.e. it is free from the cycles of birth and death. They are enlightened and complete in themselves. At this stage, their souls move to the uppermost part of the universe, for it is no more in their nature to move about in any of the ten directions of the universe; these blessed souls are enlightened and called *Siddha*s.

Although a seeker has to go through all these stages, the time taken is different for different individuals, depending on their conviction, effort and practice. One can jump several stages at once or can even attain highest state instantaneously, as in Tantra practices. All it takes is to activate the superconscious mind.

What exactly is the state of enlightenment? There are eternal laws which govern all the activities in the universe. Bhagvān Mahāvir communicated them in his *Samosaran* by *Tripadi*: The three states : everything (matter as well as sentient beings) originates, abides (while changing) and is destroyed. This is the first eternal law. Transformation in these states are carried out under the theory of *Karma*. Therefore *Karmavād*, discussed in Chapter 4 is the second eternal law. The third is *Anekāntavād*, discussed in chapter 3 which indicates the true nature of things, that "one is many and many is one" and every thing has infinite ways of manifestation. These laws are self sufficient, self evident, self manifesting, self proving and self radiating. Understanding them or realizing them is not enough but experiencing them operating on the universe is enlightenement.When this is seen, ignorance, fear and attachment is automatically abandoned. However we must realise that the most important aspect of enlightenment

is that 'no body' can achieve it. When enlightenment is achieved, no "body" remains, no "mind" remains. None of the attributes of mind remains. Therefore it is not correct to say "I want to achieve enlightenment". Even that desire will prohibit enlightenment to be attained. "I" will exist no more. Nothing remains; all that we are familiar with is lost. Only the soul (which is energy) will survive but it can not be identified with any one. This experience itself is the first step to enlightenment.Two other points regarding enlightenment may be noted. Firstly enlightenment is instantaneous, occurs suddenly whenevr it occurs, and secondly, when the enlightenment occurs, the self knows that it is enlightened. No other proof is required.If any doubt remains, it means that enlightenement has not been achieved.

The essence of describing all these steps in detail is to emphasise that it is important to keep the goal in view and take steps one by one. If one believes in the possibility of enlightenment by this path, one has already taken the first step to stage 2. Observing non-violence, searching for truth, giving up stealing and collection of things moves one up to stage 4 with several accompanying *siddhis*. Giving up anger, greed and attachment physically leads one up to stage 6 and giving them up in thought moves him further up the ladder. When all wishes, including the wish for enlightenment and *Mokṣa* ceases, all actions by deed, mind and thought are abandoned and right faith, right conduct, pure consciousness and clarity of perception is attained, one moves up to the highest state of liberation.

We have used several Sanskrit terms in the above discussion without defining them. To explain them would result in digressing from the main theme and the reader is referred to dictionaries[1] where these terms are defined.

The ascendancy of soul to various higher stages can be attained by correct perception together with certain practices. These practices are described in the next chapter.

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1. For example, Jain Paribhasika Shabdakosa published by Jain Vishwa Bharati University, Ladnun, 2009.

6

Procedures for Purification of Soul

Nanāssa sārmāyaro
Knowledge is only meaningful if it can be imbibed in conduct

Mahāvrats, The Essentials, Prayers,
Yoga, Tapa, Dhyān, Aṇuvrats, jnān, Bhavanā , Mokṣa,
Physiological, psychological and spiritual effects

Having discussed the foundations of Jainism (Cardinal Truths), the theories of true nature of the Universe (*Anekāntavād*), the laws operating in the interaction of soul and matter (*Karmavād*) and the various milestones on the path to enlightenment (*Guṇsthāns*) in the previous chapters, we now come to Kriyavad, the most important, operative part of Jainism which deals with the procedures for attaining *Mokṣa*. For this purpose we have to intimately know the body, mind and soul. We have discussed the soul and its powers, as much as is possible to describe in Chapter 2. The most fundamental aspects of soul are indescribable and can not be expressed in words or thought; they can only be experienced. Mind is very complex and it is difficult to fathom it, as we see below.

Mind

Brain is part of the body but it is governed by mind. After the omnipotent soul, mind is the most powerful entity in the Universe. Mind encompasses the whole Universe in space and time. Its scope is bigger than the Universe and longer than eternity; it has a reach anywhere in space and time, past, present and future. It can project anything. Even the "God" is a projection of mind. Mind holds the key to a man's destiny. Everything starts with a thought. A thought does not come singly; it usually arises in a chain, as a train of thoughts. Thoughts create feelings which, in turn, determine attitude of a person towards others or towards events or a situation; attitude controls man's behaviour which results in action; actions accumulate in to habits of a person; habits form a man's

personality and personality is what a man is, and this, in turn, shapes man's destiny. So it is said " a man is the master of his own destiny"; you become what you think.

The mind consists of three parts, the outer (conscious) mind, the inner (subconscious) mind and the superconscious mind, which is the seat of the soul. The outer mind consists of two parts, the logical mind, located on the left, and the intuitive and emotional mind, located to the right side. The subconscious mind is not fully active. Jainism and Buddhism have carried out lot of studies to understand the functioning of mind and activating the sub-conscious mind through meditation. Mind is multidimensional and always exists in excited state. It has unsurpassed multi tasking and parallel processing capabilities. It is the one which perceives, discriminates and forms an opinion. It is discursive, dualistic, thinking and always functions with respect to external references. It desires, compares, plots, manipulates, indulges in anger, emotions like hate, love, jealousy, greed, pride etc . Since in reality it is non-existent, all the time it is engaged in asserting, validating and confirming its existence by fragmenting, conceptualizing and accumulating experience. This ordinary mind is ceaselessly shifting and is subject to external influences, habitual tendencies and environmental conditioning. Actually, it is flickering, unstable, chaotic, confused, undisciplined, changing, repetitive and endlessly minding other's business; It is rarely concerned with the Self who is its master and does not ponder over its impermanence, death, rebirth etc.; its energy is consumed by projecting outwards. *No-mind* is its ground state when all these activities cease. The nature of pure mind is defined by five qualities: It is vast and boundless, like space and possesses wisdom of all compassing space. It is a perfect reflector, like a mirror, and precisely reflects whatever comes before it in all the details, without being affected in any way. This is the mirror like wisdom of mind. It possesses equalizing wisdom, meaning essentially that it is impartial and has no bias towards anything. It has wisdom of discernment implying that it can distinguish all phenomena without confusion. The mind also has all accomplishing wisdom, that is it can visualise, analyse, perfect and spontaneously comprehend everything it comes across.

In comparison, the inner mind, much more powerful than the outer mind is pure, pristine awareness, that is at once intelligent, cognizant, self illuminating, intuitive and always awake, but it is hidden within the outer mind, obscured by mental scurry of our thoughts. The inner mind always remains untouched by change, fear or death. It is said to be the knowledge of knowledge itself. When the outer mind goes to the state of no-mind, then the infinite faculties of the inner mind come into play and can be experienced but have to be activated, to function fully. Mind is similar to a film; if one wants to

project Self on it then the old exposures have to be erased, otherwise there will be no clarity and the Self will not be recognized. It is said that the mind is a bad master but is a good slave and therefore it has to be controlled.

Upon death, the brain dies but mind, which is also the repository of the memory, is attached to the soul through karmānus and it takes rebirth, according to the karmas.

As for the body, firstly we must realize that any living body is a miracle. It defies many basic laws applicable to the physical universe. Most importantly, it defies the law of entropy (measure of dis-orderliness), according to which the entropy of any physical system should always increase with time. Most physical systems on a large scale are formed as a consequence of chaos on a small scale thus apparently creating "order from disorder". A biological system is the most orderly system in the universe and is capable of further increasing orderliness, by its actions. The physicists do not consider this orderliness as violation of laws of physics but explain it by considering the biological system and its environment together as one system; whereas the entropy of the biological system decreases, that of the physical environment around it with which it interacts, increases much more, effectively increasing the net entropy of the whole system. Each cell of the body is in perfect order and the brain with its neural system is the most orderly system. Thus the biological system is capable of extracting energy from its environment. It is made possible by presence of soul or consciousness because physical body by itself can not extract energy from the environment. This energy is infinite and by certain practices, large amount of energy can be extracted from the environment by a living being. The scope of this process is enormous and progressive. When we eat food, every cell extracts energy from it; when we breathe, every cell gets purified and energised; Then *Chakras* (Fig.6.2), as will be discussed later, take the body to higher level of energy, making mind more energetic and orderly and reducing its entropy. All Jain practices, in effect, are aimed at reducing the entropy, increasing the orderliness and energising the system, starting with body and then mind and then consciousness. Some of these aspects will be discussed here. This is also the basis of Tantra schools of Jainism and Buddhism. We must also note that body has inbuilt amplifiers which can be activated by practice. Physics has postulated an amplification effect known as the "butterfly effect". The butterfly effect envisages that if a butterfly flutters somewhere, the atmosphere has an enormous amplification effect which can turn it into a hurricane or a giant storm elsewhere. The same is true of the biological systems which are capable of amplifying small amount of energy they extract from the environment into an enormous source of energy, by which *kundalini* can be activated.

However, it may also be mentioned that simply understanding the concepts and theories is not enough. Bhagvān Mahāvir[1] has said that unless the *jnān* (knowledge) is transformed into conduct (*charitra*), it is of no value. Although *jnān* is essential for guiding a person towards the right path, it is the practice which takes him towards the goal. Therefore it is necessary to follow these practices to achieve the final goal of enlightenment. One basic requirement is that these practices must not be carried out ritualistically but with an aim of purifying the soul. Rituals do not result in any progress. With this awareness, when one is practicing and even when one is not practicing, results can be achieved quickly. By practicing some of the procedures given here, it is said that one can achieve some *siddhis* but that should not be the aim. One should not be distracted by the attainments of *siddhis*, to avoid bondage with the *Lobha karma*, which will halt further progress. The *siddhis* are actually hurdles in the path of *Mokṣa* and should be ignored, rather than used for material or mental benefits. Bearing this condition in mind, we now turn to various Jain practices.These practices are based on three aspects: *Ahimsa* (non-violence), *sanyam* (restraint or self discipline) and *Tapa* (penance).

Mahāvrats

The primary practices are the five *Mahāvrats*, or the great vows, essential for every one, who wants to move on the path of salvation, to follow. These are *Ahimsā, Satya, Achorya, Brahmacharya*, and *Aparigrah* translated as non-violence, truth, non-stealing, celibacy, and minimizing one's requirements, respectively. We discuss them here in some detail.

Ahimsa *(Non-violence)*

Practicing non-violence is the primary requirement for attainment of salvation. The physical basis of non-violence, based on the evolution of life forms on Earth, is discussed in chapter 1. As mentioned before, all the souls are entangled with each other. Killing a *jiva* is essentially like killing a part of oneself. Again *ahimsa* should not be reduced to non-killing of living species, because that is not total non-violence; it is only the first step. Non violence is to be practiced at several levels. First by refraining to kill, then stop hurting, by all the three modes, *mana, vachana* and *karma* , i.e. by thought, speech and deeds, then feeling and experiencing the pain of others and then feeling and experiencing that the other is actually your own self. When your soul becomes one with other souls, experiences their pain and pleasure, is unhappy at their plight, then only true non violence is practiced. The highest form of non-violence, turns in to

compassion when one is able to wish, as Nagarjuna, the Buddhist monk, said "may everybody's ill deeds fructify for me, and all my virtues fructify for them" .

It is said that practicing true non-violence to the ultimate extent instantly leads to *manahparaya jnān*.

The first and foremost implication of non-violence is vegetarianism. One must not kill just to survive. Neither it is necessary nor it is desirable. How would we humans feel if there was a superior being who kills us to eat. The same feeling, the fear of death and torture, is there in lower animals. It is a misconception that meat is essential for good health. On the contrary refraining from eating meat is good for health, which can be tested by practice. Vegetarianism has many layers of practice: To refrain from killing higher animals for food, then to avoid lower animals (fungus and yeasts) and then to refrain from eating eggs which are potential source of life, then to avoid killing plants and trees for vegetables, which are also forms of life, as was discovered by Jains much before the western world and then to eat only fruits and vegetables which fall down from trees and plants on maturity by themselves and so on. It is also a misleading concept prevalent in the society that all bacteria are bad for our health. In fact our body is a storehouse of all kinds of bacteria, good and bad, of all kinds of deseases, and we can not survive without them. It is the balance between thier population which is important for good health and that can be achieved by cleanliness and not by killing them.

Following *ahimsa* to its logical extreme changes life style in toto, as will be discussed later. This will include avoiding tramping on microforms of life as one walks for example, on grass, avoiding killing water borne bacteria and breathing slowly to avoid killing of airborne *jiva*s etc. From killing one has to transcend to the next level of avoid hurting them and then experiencing oneness with them in pain and pleasure to the ultimate level when one experiences that the self (soul) and any other life is the same.

Violence of thought and action (*Himsa*) binds one to several serious types of *karmas* but more importantly to the *jnānāvarniya* and *darśanāvarniya karma*.

Satya:

Truth is the prime requirement for salvation. It should not just be interpreted as speaking the truth. Speaking truth is essential but trivial. The real meaning of this vow is continuous search for truth, which everyone has to search and find for himself. What is one's true nature? What is the ultimate truth (and goal)? Is this the true path? etc. Truth is actually woven in the universe and therefore one should examine everything

around to search for truth. Jainism does not, like Shankara, assert that the world is an illusion; rather it urges one to consider it as a reality and observe it to find the ultimate truth. This provides a common ground between science and Jainism. Jainism has proposed a mode of logic based on various 'standpoints' (*nayas*) such as practical mode (*vyavahār naya*) and definitive mode (*nishchaya naya)*. Some allotropes (*paryāys*) may be different from practical point of view but they all ultimately are manifestation of one basic thing. This kind of logic for the physical universe is mostly irrelevant now because physics deals with these problems in a different manner and is able to get to determine the nature of matter using various theoretical and experimental approaches.

Anekāntvād or multifacedness describes the ultimate reality. The principle of *Syādvād* states that every attribute is contextual and only partly true (Chapter 3). The uncertainty about complete understanding of the true nature of matter, is the only way to describe it and, according to this principle, the most certain statement one can make is that the true nature of things can not be described with certainty.Therefore uncertainty is the only statement which is certian. This principle can be applied to the constituents of the physical universe as well as to Self. Ignoring this fact is falsehood and falsehood binds one to several types of *karmas*, depending on the motive, but above all, binds to *jnānāvarniya karma*.

Brahmacharya

Sexual energy is the main source of physical energy in the body. *Brahmacharya* implies that sexual energy is used for mental upliftment and physical betterment and requires that it is not wasted in trivial pleasures. In practice, *Brahmacharya* means non-misuse of sexual energy and avoiding sexual misconduct and lust, which is only one aspect. Actually the whole life style, daily routine and behavior should be consistent with preserving and enhancing the sexual energy to the extent possible. At the extreme level it is equated to celibacy. Abstinence is only the first of these steps. The desire for sex in thought and speech also depletes energy and should be minimised or avoided. Whereas continuous and intense concentration is required for attaining *Mokṣa*, any thought of sexual activities or thought acts as a distraction. The argument for observing celibacy is that one requires all the energy at his disposal to attain something as difficult as *Mokṣa*. *Brahmacharya* should thus be practiced at several levels and in a broad sense all activities of mind and body which result in depletion of energy should be avoided and activities which enhance energy at physical, mental and spiritual levels are

recommended.

Indulgence in sexual activities not only depletes the much required energy for attaining *Mokṣa*, it binds one to *Mohaniya karma*.

Aparigraha and Achorya

Minimising one's requirement is the prime requirement of realizing the transient nature of worldly possessions. *Aparigraha* and *Achorya* are the two sides of the same coin. One really does not need much to survive and possession is a *bandh*, a kind of hurdle in spiritual progress. Again, *aparigrah* (or non-hoarding) should be practiced at various levels; Possessing only those things which are needed and minimizing one's requirement is only the first step. At a deeper level, when one realizes that all the souls are one, and the whole of the universe is manifestation of the Self, the whole universe belongs to him. It becomes meaningless to possess anything, much less steal it, if the whole universe belongs to one. If one is indulging in stealing, the one thought which should come to mind is that if the same thing is stolen from him, how much hurt will he feel. According to laws of *Karma*, if one steals something from others, the same is bound to happen to him one day or the other. This is reason enough to refrain from stealing. Not for the fear of loss, but the main reason to refrain from excessive possession and stealing is that they bind one very tightly to *mohaniya karma*.

The Essentials:

Once a seeker has decided that the path of the *Mokṣa* is to be pursued, his attitude towards himself and others changes and he becomes inclined to practice the five *Mahāvrats*. For a true seeker, the five *Mahāvrats* mentioned above, are to be observed life long but it is difficult to practice them rigorously due to various reasons we encounter in our daily life. It is therefore essential to review our behaviour and correct it. For this reasone a few daily rituals are prescribed as "Essentials" (*Āvashyak*). These rituals include *sāmāyik* and *pratikraman*. *Sāmāyik* is a word derived from *samaya* which means state of equanimity. One must sit in a stable, motionless posture and meditate or devote time for *dharma-dhyān*. It entails physical control of body accompanied by mental control, seeking forgiveness for any violations of any *mahāvrats* or for any hurt caused to any living being. It is prescribed to be practiced for 48 minutes, a *muhurt* determined from a day of 24 hours divided in 30 parts based on biorhythms, but one can mentally stay in that mode, while conducting other duties, as long as one desires.

Pratikraman (returning to self) is usually performed in morning or evening, withdrawing your energy inwards from various activities performed during the night and day and asking for forgiveness for any acts of commission and omission. It is essentially opposite or reverse of *ākraman*, meaning attack.

In both these activities seeking *mangal* (well being) of every one and seeking forgiveness from those who have been hurt by your actions are the main objectives. This helps dissolving *jnānāvarniya* and *darśanāvarniya karmas*.

Prayers:

Prayer connects the self to the cosmic energy. Psychological effects of prayers are immense. It is the first step towards acquiring mental peace and *samyakatva*. They prepare one better to face the worldly situations, specially if they are adverse, with confidence and optimism. Prayers should not be ritualistic and should be performed in the simplest possible way, bearing in mind that the wish to pray is prayer itself . It should however be noted that prayers can not dissolve the *karmas* which one has earned, no matter how intense the prayers are. Even *Arihants* have no powers to absolve one of his past *karmas*, good or bad. All they can do is to show the right path and thus refrain one from acquiring fresh binding *karmas*. One should therefore pray only to get the right direction and for conviction for right action and not for some worldly benefits. Demanding or expecting material or even spiritual benefits by praying to anyone binds one to *mohaniya karma* and therefore prayer should only be made for purifying the self.

Yoga

Yoga literally means union. A system can be strengthened by union with other systems, by addition of other faculties or we can say by the process of *Yoga*. It can be applied in different contexts. For example when mind, speech, body and soul can act in an additive mode, i.e. in unison, it makes one of the most powerful systems and can lead to emancipation (*Mokṣa*). Even when the process is applied to any one of them, say body, and all the cells of the body work in an additive mode, i.e. in unison (or resonance), it can become an extremely powerful agent for achieving a goal. Yoga of body cells can be achieved by *Tapa* or *Bhakti*. Similarly when all the neurons in the brain can be joined together or work in unison, the mind can become very powerful. Likewise, when conscious, subconscious and superconscious minds are united by yoga or meditation, a new insight in to the functioning of the universe is attained. Yoga consists of several practices (*yama, niyam, asan, pranayam, pratyahar, dharana,*

dhyan and samadhi).Yama is designed for mental purification and consists of *ahimsa, satya, asteya, Brahmacharya, aparigrah,* the five *Mahāvrats* discussed above. *Niyam* is designed for purification of the body, and includes *shauch* (cleanliness), *santosh* (satisfaction), *tapa, swādhyāya, prānidhan* (total dedication to the cosmic power). Once body and mind are purified, the third aspect of yoga, *Yogasanas* can help establish connection between body and mind through nervous system. Some of the asanas recommended for this purpose are *Bhujangāsan, sarvāngāsan, halāsan, shavāsan and padmāsan. Goduhāsan* increases the *virya* and provides energy required for difficult physical, mental and spiritual goals. The idea of various *yogāsans* is to increase the flow of blood in the corresponding points of various chakras. Yogasans must be accompanied by pranayam (enhancement and control of *prāna shakti*). Some aspects of the other stages of yoga i.e. *pratyāhar, dhāranā, dhyān* and *Samādhi* will be discussed later on. The yoga thus provides a path to achieve *Mokṣa.* Cultivating spiritual consciousness requires activation of *Kundalini,* which is the Vagus tenth cranial nerve, lying dormant in the Manipur *chakra.* Meditation in various postures can activate the *Kundalini* by flow of blood and energy. Thus it is essential to sit in *padmāsan, vajrāsan* or *sukhāsan* with erect spinal chord, as straight as an arrow, to enter in to meditation.

Tapa (penance)

Tapa is the practice of austerity or penance. The main goal of these austerities is to awaken the dormant powers of the body and to break various habits which are formed because of the bonds between various sensory organs (*indriyas*) and conscious and subconscious mind (*mana* and *chetanā*) and to dissolve past *karmas*. Habits create obstructions in keeping the mind alert. It is the first step towards purifying body and mind. Simple mortification of body may not be of much help and the essential requirement is that tapas should be practiced with the purpose of meditation on the *ātmā. Tapas* are of two types: external and internal. External *tapas* are of six types (*anshan, unodari, vrittisankshep, rasparityāg , sanyam* and *sanleentā*). All these *tapas* are equally applicable to all the *indriyas* and are not just confined to food. Because of the fast and continuing mental evolution of the human mind (mana), which is not yet fully mature, the requirement of all the *indriyas* is controlled by mind and not by actual physical need. The requirements assessed by mind is therefore virtual and not real. Mind thus acts as an undesirable and interfering agency between requirement and fulfillment of the physical needs of various *indriyas. Anshan* helps in assessing the actual physical need of

each *indriya* i.e. hunger, sex, speech, vision, smell etc. Jainism firmly believes that state of mind depends on food one takes. No food can lead to the state of no-mind. *Anshan* begins with eating sātvik food, fasting at various levels, from eating only once a day to observing fast for one day (*Apvās*: *Appā* means *ātmā* and *Vās* means to stay with it) or more (two, three , eight or ten days) and then to a month and beyond. Contrary to the general belief, it is not only possible but quite easy to fast for days together. At physical level, this helps all the cells of the body to unite and act in unison, hunger or want of nourishment being the uniting motivation; on mental level, it unites the brain and body, on consciousness level, it helps one to live worry free and meditate, because food is a distraction in meditation. The other forms of *tapa* are taking salt and oil free food for a day (*Āyambil*) or more (*Oli*) and there are many forms varying from a month to a year of taking meals of a particular type with a particular schedule (*Varshitapa,Vardhmān tapa* etc). Fasting unto death (*Sanlekhanā or Santhaārā* is the extreme tapa which completely removes fear of death.

Death has a special significance in Jainism because it is the doorway to another life. It should not be considered as an end in itself but a beginning of next life. One should meditate and watch oneself dying rather than make efforts to continue it beyond its utility. *Sanlekhanā* is a sure way to witness one's own death. The last state of mind has much to do with the next birth. Fear of death and any form of grasping, yearning, longing and any trace of attachment to physical and mental relationships (worldly possessions and near and dear relatives) must be totally dissolved.

For best results, fasting of various types must be accompanied by various practices of meditations. In fact meditation itself automatically leads to various types of tapas. *Unodari tapa*, i.e. providing little less than the physical requirement of each *indriya* then controls each of them and in turn leads to abolish the control of the mind on them. *Vrittisankshep*, focuses on each centre i.e. *Kendra* (*indriya*) and contracts it to its core, avoiding interference with the function of the other. *Rasparityāg* is to break the links between *mana* and *chetanā* because *mana* can not control the *indriyas* without the support of *chetanā*. *Mana* and *indriyas* both die out at death but *chetana* reincarnates them again in the next birth. They have physiological effects on various body parameters as well as psychological effects. When one realises that *kāyā* is the source of all *kleshas*, and accepts the body as it is and the mind does not get affected when the body is subjected to pain, one attains the state of *kāyāklesha*. After connecting to the cosmic energy, channelising it towards the goal of *Mokṣa* is *sanyam*. To turn the

energy inwards and not to be distracted from the chosen path, happen what may, such that no good or bad karmas can produce any vibrations in the mind is the state of *stithipragya*, attained by *sanyam*. The ultimate state attained by practicing all these *Bahyāntar tapas* is *sanleentā* when no part of the body or mind moves or acts without the consent or direction of the consciousness and then all act in consonance.

Internal *Tapas* (*Abhayantar tapa*) involve *prāyaschit* (repentence or atonement for bad deeds), *vinay* (humility or politeness), *vaiyāvacha* (service to others for dissolving the effects of past bad karmas), *Svadhyaya* (study of self), *Dhyāna* (meditation) and *Kayotsarga* (separation of body and self). Dhyan involves remembering (*smriti*), returning (*pratikraman*) and reliving the past lives (*jātismaran*) etc. With the practice of various tapas, the bonds between body and mind as well as mind and consciousness are broken and inflow of karmas is stopped.

Dhyān (meditation)

Dhyān is the prime requirement for mental, spiritual and physical unity of self. It is the least understood of all practices and is made out to be difficult to accomplish, whereas in practice it is very easy. In fact one is meditating all the time, because mind can not stay without thought. It is only necessary to channelize the thinking. What then is *dhyān*? It begins as a kind of self-hypnosis. It is certainly not thinking, but it is convincing one self (acquiring correct *darshan*) and then it takes one beyond mind. The conscious mind has multi dimensional capability. It can think parallelly on a large number of topics at the same time. With thoughts, the mind is ever changing and wandering to different objects, phenomena, events, expectations, apprehensions etc in time (past and future) and space. To use the whole capability of mind on one topic is concentration. Channelising this concentration on soul is *Dhyān*. Firstly the ever changing, wandering, conscious mind is to become one mind by meditation, then the conscious and subconscious minds have to be integrated and thereafter one has to attain the state of no-mind. Any unaltered state of mind is *dhyān*. Since subconscious mind is mostly unutilised, a bridge between conscious and subconscious mind opens up immense possibilities. No-mind is the only permanent state of mind; once attained, can always be attained at will. And then one is able to "see" the soul as an observer. In a nut shell, seeing the *ātmā* (soul) with the *ātmā* (soul) is *dhyān*. *Dhyān* physically means activating the pineal gland, the third eye, which is an interface between mind and *ātmā*. There are many types of *Dhyān*s and innumerable ways of achieving it; some of which are listed in Table 6.2. The fact that it can be achieved in innumerable ways implies that it is easy to accomplish.

Basically *Dhyān* is of four types: *Ā*rta *Dhyān*, *Raudra Dhyān*, *Dharma Dhyān* and *Shukla Dhyān*. *Ārta Dhyān* is when the mind is engaged in criticizing some thing or somebody and complain about it. Our mind gets so engrossed in this activity that we forget everything, including our self. *Raudra Dhyān* is about cursing some event or a person whom we think may be responsible for our miseries. When we do not consider ourselves responsible for an unpleasant event, we hold others responsible and blame him. In this activity again we get so engrossed that we forget our goal and even our self. Thus we have seen that it needs no special efforts to get into *Ārta* or *Raudra Dhyān*. The mind is engaged in them all the time, with intense feeling and involvement. But these two types of *Dhyān*s are energy consuming and lead us away from our objective of moving to higher *Gunsthāns*. Nothing is achieved by practicing them, except more misery.

Dharma Dhyān is channeling our attention and energy in a positive mode, leading us to accumulation of energy. It is only a matter of channelizing our ability of *Ārta* and *Raudra Dhyān* in a positive way to enter into *Dharma Dhyān*. Shukla *Dhyān* is the ultimate goal, when one does not think either ill or well being of others. One's mind becomes totally empty and its energy is not dissipated.

The various methods of meditation are based on three basic techniques: concentration on an object, *mantra* or *prāna* (breath). Besides concentrating on breathing (inhalation and exhalation), or on a statue or image (*Iṣtadev*, symbol, *chakra etc.*), *Dhyān* can be attained by focusing the mind on a sound (*japa*), a thought, or soul. Some practical methods proposed for attaining *Dhyān* are listed in Table 6.1 and one has to select one which will suit an individual best. One practice is to let all thoughts, bad and good, pass by till they are exhausted. The mind always desires change. When all the ill feelings, leading to *ārta* and *raudra Dhyān* are exhausted, the mind itself will turn to *Dharma* or *Shukla Dhyān*. But this takes time if we are full of bad feelings about others and hold them responsible for our ills, whereas the truth is that we are ourselves responsible for our fate. When this is realised, meditation will turn to *Shukla Dhyān*. *Shukla Dhyān* is the primary requirement for achieving *Samādhi*.

We do not discuss the various procedures of meditation here except to mention that *dhyan* needs to be cultivated by continuous practice, preferably at the same place, at the same time.Irrespective of the procedure adopted, initially the two parts of the conscious mind have to be activated, the one which concentrates (on *Iṣtadev* or breathing, for example) and the other which monitors the concentration and brings it back to the object of concentration, whenever it goes adrift. The period of distraction

reduces with practice. When it becomes zero, that is complete and continuous concentration for long period (minutes to hours) is attained, both the parts, the concentrating mind and the monitoring mind become united in to one. At that point, one can concentrate on any object or thought at will. Then comes the stage of no mind or thoughtlessness. When thoughtlessness is achieved, that is one can bypass the mind and go directly to consciousness, one has to activate the analytical part of the mind and learn everything about the object of thought. This leads to new insight in to nature of the object. In advance stage of meditation, one should not make any effort by body, neither recite anything, nor think anything by mind. Essentially one should become like a mountain, immovable, determined and unconcerned.This way one will stabilize and the soul will be immersed in the soul. This is the ultimate meditation.

There are three prerequisites of attaining the state of meditation: Devotion (full faith in the method one is employing to attain *Samādhi*), Determination (that I will attain Samādhi in this sitting, no matter how much time and effort it takes) and Dedication (put everything at stake, your whole world to attain *Samādhi*).

Intense meditation can be done for a short period of time to orient the mind but meditation must go on in the background all the time of day or night irrespective of what one is engaged in, to achieve substantial results. The first step is to observe one's own mind, its behavior, its response (anger, greed, attachment, pride, ego etc) to various situations and persons, and to evaluate and classify one's own mind. By observing one's mind, one can soon come to the conclusion that mind forms its opinion on flimsy ground, is always fluctuating, inconsistent, mean, dominated by negative aspects more than by positive aspects, can not be relied upon and is worthy of discarding. After the strengths and weaknesses of one's mind is evaluated, the next step is to channelise the thoughts.

The best course is to concentrate on one's "*Îṣtadev*" knowing very well that the "*Îṣtadev*" is only a projection of its mind and play of one's own consciousness. The *Tantra* method of Jainism is so powerful that it can animate the *Îṣtadev*, put life in to it and feel it as real, bringing it out from the virtual realm to the realm of real existence. Intense contemplation on the image of *Iṣtadev* in a mirror can animate the *Iṣtadev*, substantial enough to touch, feel and talk to.

Several experiential milestones on the path to meditation have been mentioned in the texts. Once continuous meditation on *Iṣtdev* is attained, the next stage is to feel, without any shadow of doubt one ness with "Him", i.e. "I am *Îṣtadev*" (*So-ham or Aham Brahmāsmi*). This leads to the attainment of non-duality (*Advaita*) and the power of the diety is achieved. Psychic heat, i.e. a kind of inner fire is thus produced which is a kind of psychic force. Controlled respiration and intense mental concentration causes an illumination that fills the body, which then expands to fill the whole universe. This Contemplation on one's image in a mirror enables one to recognize the illusory nature of the body and then of all objects in the Universe. It leads to the realization that mental perception is not trustworthy. One can also meditate on Dream whence one can enter dream state at will and return to wakeful state without break, thus realizing illusory state of wakefulness, sleep and dream. This is the "fourth" state (*Turyā*) of mind. One can also meditate on divine light and then achieve a state of transference of consciousness from one body to another body or from one place to another place. All these practices eventually lead to immaculate mind, state of time-less-ness or *Samādhi*, beyond past and future, which is the final goal.

Table 6.1: Methods of meditation

	Type of meditation		**Type of meditation**
1	*Preksha Dhyān*	7	*Nidrā Dhyān*
2	*Kayotsarg*	8	*Spand Dhyān*
3	*Vipassanā*	9	*Yoga Nidrā*
4	Transcendental Meditation	10	*Mantra Dhyān*
5	*Pātanjali Dhyān*	11	*Swapna Dhyān*
6	*Sahaj Dhyān*	12	*Mrityu Dhyān*

Two points must be mentioned to conclude the discussion on meditation. Firstly it should be borne in mind that process of mediation is not meditation. Therefore some tests must be applied to confirm one's state of meditation. On outer aspects, change of attitude (towards being more kind and compassionate to others, of anger, jealousy, desire, pride etc), behaviour (tranquility, quality of dreams, lessening frequency of distraction etc) can be a measure of the state of success. The real confirmation of meditation is that even when the meditator leaves meditation, meditation does not leave the meditator. It continues all the time.

Aṇuvrats

The best course to master good conduct is to begin with small steps. These simple and small steps are called *Aṇuvrats* (small vows). The Five main *Aṇuvrats are* as follows:

1. Avoiding injury to mobile beings which have two or more senses or desisting from deliberate acts of violence.
2. Truthfulness to avoid false statements out of extreme affection or hatred for someone.
3. Refraining from taking anything not given.
4. Desisting from sexual relationship with any one other than one's spouse .
5. Voluntarily minimising the possession of all forms of assets.

These can be supplemented by more Aṇuvrats such as confining movement within a limited area, saving the environment from wanton destruction, avoiding sinful acts for a predetermined short period of time, observing fast, limiting use of consumable and non consumable goods and sharing food etc with others. These small steps will go a long way as one gets benefited in physical, mental and spiritual health and leads to sustainable environment.

In a typical Jain home it is prohibited to waste food, water and electricity (and

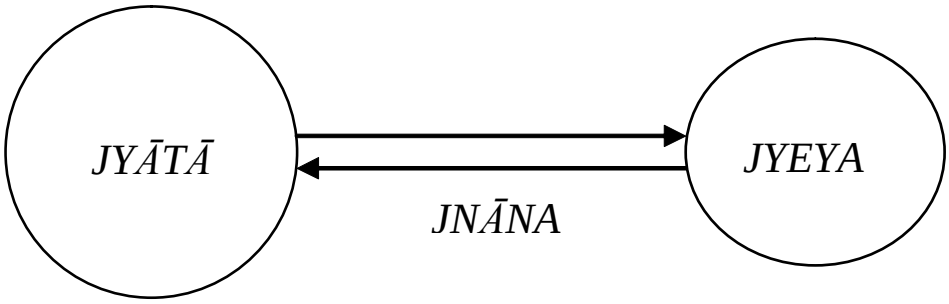

Fig.6.1. The interaction between the knower (*jnātā*) and the object (*Jneya*) via knowledge (*jnān*) indicating that an observation modifies both the knower and the object, making it impossible to know their "state" completely at any instant by any observation.

other forms of energy) and people try to minimize hurting the feeling of others, by their deeds, speech and thought. Every year a universal day of forgiveness is observed. After a 8 or 10 day period, called *Paryushan*, of observing various Jain rituals (fasting, *maun, samayik, Pratikraman* etc), to the extent possible to purify body, mind and soul, everyone seeks forgiveness, not only from those with whom they interact but from all the *jivas* of the universe and, at the same time, also forgive them. This mutual act of seeking and granting forgiveness, eliminates several serious *karmas* and bring harmony and peace in the world.

Jñān

Meditation empties one's mind of undesirable information and when the mind is empty, true knowledge will spontaneously descend in it. This happens because the nature does not sustain vacuum and absolute vacuum can not exist anywhere. The knowledge already exists within self, but does not appear because it is covered by *jñānāvarniya karma. Jñān* is pure knowledge, uninfluenced by the mind of the the subject or the appearance of object. Knowledge is usually information and in this context *Jnân* is something more than knowledge as it implies wisdom and not just information.

As mentioned before, the universe consists of *jiva* and *ajiva*, the knower and the known. So there are three entities *Jñātā, Jñeya* and *Jñān* i.e. the knower, the known (object) and knowledge (Fig. 6.1). The *Jnātā* and *Jyeya*, *both* continuously modify each other through *Jnān*, i.e. by interaction and transfer of knowledge. Observations influencing the state of an object has been discovered by science and is called the Uncertainty Principle, which states that all the attributes of an object can not be simultaneously determined with precision because the object changes with each measurement as will be discussed in Chapter 7. The effect on psyche or knowledge of the observer by observing an object is obvious because that is how knowledge is gathered. This is also the physical basis of Darwinian evolution. Evolution takes place in steps (quantum states) when *jiva* interacts with the physical world and modifies itself. Every time *Jiva* observes a physical object or process, its state of mind changes. This also explains how worshipping an inanimate statue of the Lord changes the state of a person. The changes could be to a higher or lower conscious state, depending on the interaction. This is happening all the time, albeit in infinitesimal steps but the cumulative effect over the ages is clear as discussed in chapter 1.

When the distinction between the three of them i.e. *Jnātā, Jneya* and *Jnān* dissolves, only *jñān* remains and *Jnātā* and *Jñeya* disappear. That is the state of pure

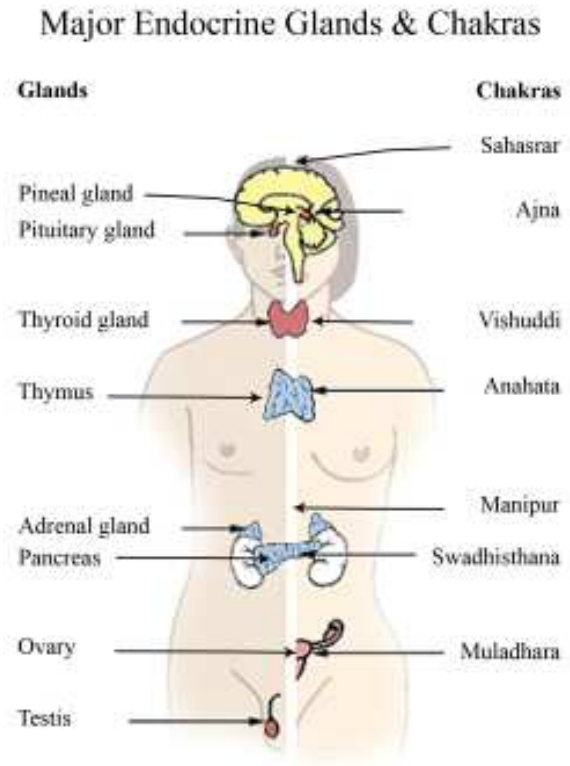

Fig. 6.2 Various chakras in the body (right) correspond to various glands (left), which can be activated by practicing various yogasans, Seven main Chakras are shown.

knowledge. It is said that *jnān* is the "body" of the *Siddha*s.

Jainism recognises *Jnāns* of five types: *Mati jñān (sensory knowledge), Shruta jñān (scriptural knowledge), Avadhi jñān* (clairvoyance), *Manah paryāya jnān* (telepathy) and *keval jñān (omniscience)*. *Mati* and *Shruta jñāns* are sensory and *Avadhi, Manaha paryāya* and *Keval jñāns* are extra-sensory.

Mati jñān*:*

It is the primitive, innate type of *jñān*, one which is born with and acquired by sensory interaction with the environment. Even primitive *jiva*s, including single celled species have it in some measure or form.

Shruta jñān is the one acquired by interaction with persons or scriptures. This leads to one's evolution and then gradually it becomes part of *mati jñān*. All *jiva*s

acquire it by interaction and only some higher animals are capable of acquiring high level of *shruta jñān* through teachings of the Guru or scriptures.

Avadhi jñān (clairvoyance) is the knowledge transcending space and time. To a limited extent it is sensory and can be acquired by training of the mind or by acquired *siddhis*. Many scientists can tell about the past and future of various objects, near and far in the universe by using some theories or using some indriya (sensory) enhancing instruments of seeing and listening, e.g. through telescope, microscope etc. However, to a large extent the *Avadhi jñān* is extra sensory.

Manah pary*āy jñān* is entirely a capability of consciousness. When one practices non-violence in totality, one can enter or read thoughts of others.

Keval jñān (*Keval* implies "only" and *jñān* means knowledge) implying that one looses all identity of body and mind except the knowledge one possesses; a stage of consciousness (*chetanā*). This *jñān* is super sensory. It can be acquired, not by sensory organs but by the consciousness. It is a state in which one can see all the *paryāyas* of all *dravyas*, in time (past, present and future) and space all at once. It is acquired in the state of Samādhi. It is Omniscience.

Attitude (Bhāvanā):

The attitude of a person practicing Jainism towards himself, others and the universe changes. He continuously ponders over the basic aspects of Jainism and this is described in 12 attitudes. These can be summarized as follows:

"Oh Soul, Whatever you see around is perishable (*kshan bhangur*), exists by coincidence and is not everlasting (*anitya*). You are absolutely alone (*nitānt akelā*) and there is no one in this world to protect you (give you *sharan*); your karma is your only protection and can save you. There is no happiness (*sukh*) in the world, every one is indifferent (*parāye*). This body in which you reside is impure, abode of bones, flesh, blood and excreta. It looks alive and beautiful only because of your (*Ātmās*) presence in it. Here every one is trying to involve you in sensual pleasures, jealousy, attachment and anger (*Rāga, dvesh, moha and krodh*). Take all this as false and get totally involved in your own self. By penance free yourself from worldly bondage and by various practices (*japa, Tapa, sheel, sanyam and tyāga*), roam in your consciousness and attain the correct perception, true knowledge and perfect behavior (*Samyag darśan, Samyag jñān, and Samyag charitra*). Equipped with *Anekānt a*, moving on the path of *Dharma*, following *Syadvad*, free yourself from all bondages and

reside in the *Siddha ṣila*.

Every one is aware of the impermanence of life. We all know that we are bound to die but when and how we do not know. Whether tomorrow will come first or the next birth (i.e. death) we do not know. This should be borne in mind all the time and is adequate to motivate us for the pursuit of enlightenment.

Mokṣa

By practicing the Jain path, described above, the self ultimately becomes free of all bondages, good and bad, and sheds all the material particles bound to it, even the finest *karmānus*. In this state, the self attains state of unprecedented purity and the highest level of consciousness. In this state the self "perceives" everything past, present and future without the assistance of sensory organs, all at once. The ecstasy of this state can be verily compared to a blind man getting vision. Just this one reason i.e. to know everything as it is, is compelling enough for one to seek omniscience and follow the path of *Mokṣa*. In this state of omniscience the soul acquires the correct perception and infinite powers. The Self experiences *jnān, ānand, chetanā and virya* in infinite measure. Having achieved its goal, the soul then does not have to go through the cycles of rebirth, and eternally exists in a permanent state of bliss, at one (upper) edge of the universe (*Siddha ṣila*). The ultimate goal of the universe seems to be the separation of *jiva* and *ajiva* in their pure states: the souls moving to *Siddha ṣila* and eternally staying there and the matter remaining in the *Loka*.

Physiological, psychological and spiritual effects of Jain practices

According to Jainism, a body is a multilayered entity. The various procedures described in the previous chapter like *Tapa*, which mostly include dietary practices, *Dhyān*, *maun*, *sāmāyik* etc, are directed towards shedding of *karma,* and affect the body, mind and soul at all levels. These effects have been demonstrated convincingly but have not been quantitatively documented. The physiological effects enhance metabolism by activating various chakras (Fig. 6.2) and result in improvement in body parameters like oxygen consumption, blood pressure, diabetes etc; the psychological effects include changes in EEG (electro encephalogram, such as stable alpha and theta brain waves recorded during trancendental and Zen meditation), better concentration, and capacity to face adverse situations with calm and peace. The spiritual effects include acquisition of several types of *siddhis* and moving to higher *Gunsthāns.*

7

Jainism and Modern Physics

Before the universe, there was Dharma (laws)

There is nothing universal except the laws of physics.
Nothing is absolute, neither time, nor space.
Everything depends on the frame of reference.

Scientific basis of Jainism,
Nature of matter, science Sūtras,
Jainism and modern physics

Science is truly universal, based on certain laws which are non subjective, applicable every where, at all times and acceptable to all. We began this book by claiming that Jainism is also universal, based on some eternal laws which are non-subjective and in this respect appears to be quite scientific in its approach. It may therefore be appropriate to look for some common ground between science and Jainism. The purpose of this chapter is to critically examine if such a common ground exists.

Jainism divides the universe in two independent entities, *jiva* and *Ajiva*, the latter being the subject matter of science. The true nature of both *Jiva* and A*jiva* is multifacedness, with infinite attributes, correctly described by *Anekāntavād*, in contextual relation (*Syādvād*) and can be expressed in seven folded mode of *saptbhangi*. These laws are mentioned in various Jain scriptures (e.g. *Bhagvati Sūtra*) but the physical concepts are best summarised in *Tattvārtha Sūtra* of Umaswati, written some 1800 years ago. In particular, Chapter 5 of *Tattvārtha Sūtra* is devoted to physics. We resort to this book for comparing science with Jainism.

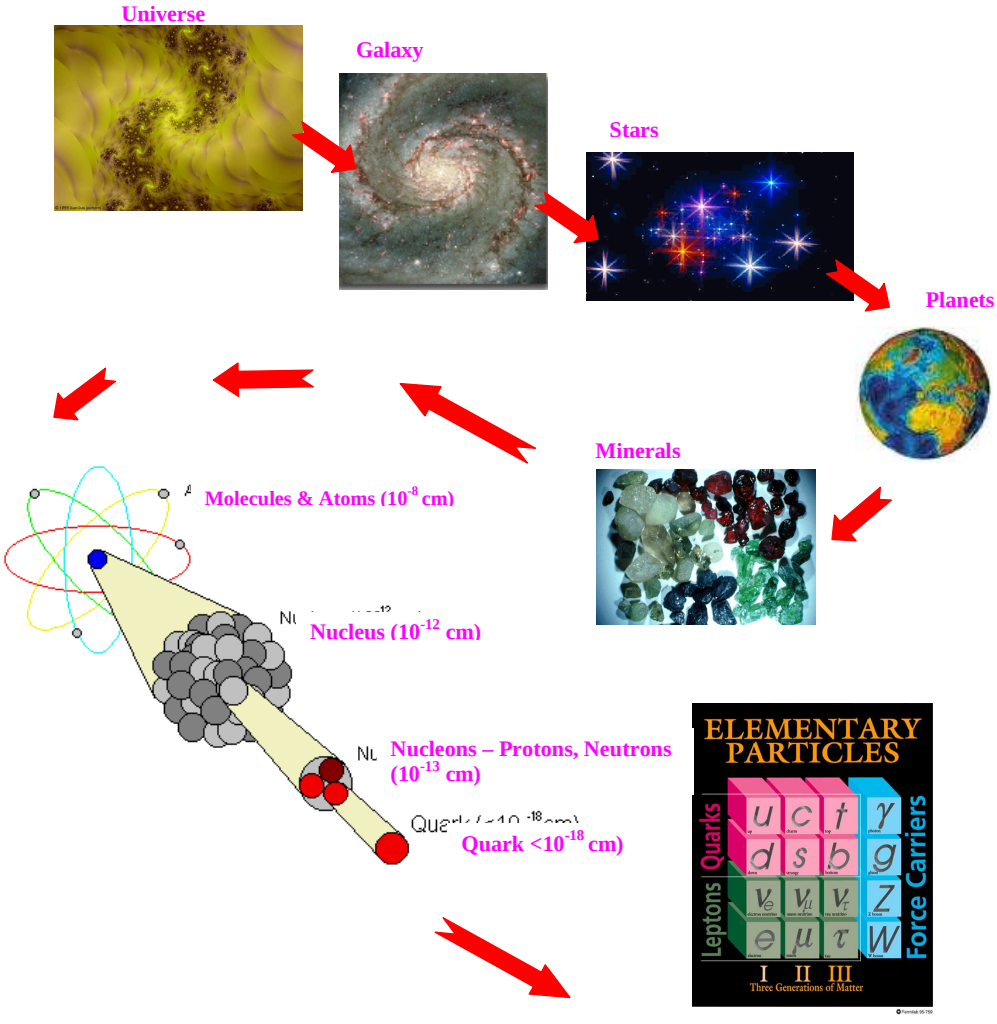

Fig. 7.1. Macro to the micro universe showing the sequence from the gross to the subtle components of nature. Sixty Elementary Particles (Quarks, Leptons and the Force carriers, together with their antiparticles), known to be the building blocks of matter are arranged in the box on lower right according to their attributes.

As far as physical universe is concerned, science asserts that it is governed by certain laws. Science recognizes matter (energy and matter are inter-convertible), three types of forces (gravitation, electroweak (which includes electricity, magnetism and weak nuclear forces) and strong nuclear forces) and fields, space-time as the elements constituting the physical universe. It is possible that all the forces, both attractive and repulsive, may be manifestation of a single force, but they have not yet been integrated in one as electricity, magnetism and weak nuclear forces, earlier considered to be independent, were integrated in one electroweak force. Thus the physical universe, as we understand it now, is made of four components: space, matter (and energy), force fields and time. In comparison, Jainism states that the material universe is composed of five components: space, matter, *Dharmâstikāya, Adharmâstikāya* and time. Thus there is agreement between science and Jainism on the three constituents of the Universe i.e. matter, space and time. Physics has already shown that there is nothing like medium of motion (earlier postulated as all pervading aether i.e. considered to be equivalent of *Dharmastikāya* by some scholars*)* by the experiments conducted by Michelson and Morley and we do not have the faintest idea of what *Adharmastikāya* (medium of rest) could be. This may be a subject of further investigation.

Science has made tremendous progress in the last four hundred years and the behavior of matter is well understood. Physics has divided matter in two parts, the macro and the micro, where respectively classical physics and quantum physics are applicable. To appreciate this natural division into macro and micro, it may be desirable to briefly go through the historical developments leading to quantum physics and describe the important concepts and basic principles of physics.

Science view of macro and the micro world

The universe is made up of matter which range in size from the smallest invisible entities to the biggest unfathomable entities. The smallest entity known at present are quarks although search for even smaller entities is continuing. The biggest is of course the universe, by definition, but currently scientists are talking of multiverses, which is actually a group of universes. Astronomical observations suggest that our Universe was formed some 14 billion years ago in Big Bang. It consists of over 200 billion galaxies, each of which consists of more than 100 billion stars and even more planetary (rocky) objects (Figure 7.1). All the matter in the Universe is made up of several thousands of chemical compounds, several hundreds of minerals and over a hundred elementary particles. The visible universe with all its diverse components is basically

made up of some 118 elements (92 stable and long lived radioactive elements and about 26 short lived elements, synthesized by nuclear reactions in stars, but not naturally occurring on Earth now). The vast tree representing diversity of matter and life in the universe formed out of just a hundred odd elements, acting as the basic bricks compelled philosophers to hypothesise that the root cause of all the elements may be some smaller number of elementary particles, may be even just one. This principle was at the heart of Dalton's atomic theory. The initial search for these building blocks of matter were encouraging and was even taken to support this idea of one basic constituent of all matter and hydrogen was recognized as the atom out of which all the known elements could be formed. As the search for the ultimate constituents of matter continued, three particles, proton, electron and neutron were discovered from which all the 118 elements and their 2000 isotopes could be formed. This trinity could be used in different proportions to build the whole physical universe. This strengthened the belief in *Ekantavad*, i.e. **one** can give rise to **many** but as further research continued, serious problems arose. By the nineteen sixties, using large high energy accelerators, scientists were able to discover hundreds of elementary particles. Such large number of elementary particles could not be the building blocks for making just a hundred elements and therefore it was postulated that the so called elementary particles should be made up of only a few fundamental entities.

The visible universe (minerals, rocks, planets, stars galaxies etc or the gross world) follows the classical physics. Basically, the state of the gross universe can be determined by summing up the state of all its components. If mass (m), velocity (v) and position (x) of all the components are known, the state of the system can be determined by the proposition that the whole is the sum of parts.

$$\text{Whole} = \sum (m, v, x)_{\text{parts}}$$

There are only few attributes of the objects of the physical world: mass (and energy) and form (shape), which also change with time. The origin of mass is still not understood. Ernst Mach made an attempt to explain it by what is known after him as Mach's Principle. Broadly speaking Mach's principle states that the inertial mass of a body is solely due to interaction of other bodies in the universe. Heller mentions it in the following way "The local inertial frames are entirely determined by the distribution and motion of all matter present in the universe" and Einstein formulated it as " the entire inertia of a point mass is the effect of the presence of all other masses, deriving from a kind of interaction from the latter" There is yet no "proof" for this principle but Einstein

is said to have derived much inspiration from the Mach's principle in development of his Theory of Relativity.

As we go to the level of molecules and elementary particles, the classical physics fails to hold and quantum physics has to be invoked and some new principles come into play. Thus there is a division between physical laws of classical physics, applicable to the gross universe, roughly bigger than an atom, and the quantum physics applicable to the subtle world, consisting of elementary particles and the micro universe. In classical physics, a proposition that " a particle is at position x" is either true or false. In contrast, in quantum physics, the best that can be said is that if a measurement of position is made, the probability that the particle will be at a position x would lie between 0 to 1. Most concepts of common sense are not valid in quantum world.

More importantly, quantum world is not just a classical, mechanical, Newtonian world where processes follow the law of mechanics but it showed that there are qualities which are influenced by observation. There is something like behavior of particles which can change under observation. This is the first step towards understanding the interaction between jiva and ajiva.

Quantum Mechanics

Quantum mechanics puts severe constraints on certainty of our knowledge. Two tenets of quantum mechanics that are relevant here can be crudely described as follows. One is that the universe does not exist if you don't observe it, equivalent to the paradox of the Schrödinger's cat (for popular exposition, see e.g. Gribbin, 1993). This implies that universe and the observer exist as pairs and neither can exist without the other. The other concept is that a particle behaves in different ways at different times. This is clear from the famous two-slit experiment (Fig 7.2) which is the backbone of quantum mechanics and particle-wave duality.

Quantum numbers:

Besides, the normal properties like mass, electrical charge, motion etc, the elementary particles have several other attributes which are denoted by Quantum numbers. These quantum numbers do not change continuously but in steps i.e. in multiples of simple numbers like 1 or 1/2, a concept of the quantum theory. Since we are venturing into the unknown territory of physics, names have been given at the fancy of the discoverer and should not be interpreted in terms of their literal meaning. Thus spin may not mean spin in the ordinary sense and there are quantum numbers like

isospin, and positional (e.g. orbital) quantum numbers. Quarks, leptons and gluons are currently considered to be the basic building blocks out of which all the matter of the physical world is made. Protons, electrons and neutrons are now thought of as being built from six quarks and six leptons. The current particle models due to Gell-mann and others indicate three generations of quarks and leptons. Leptons include electron like particles, sometimes called mesons and the associated mass-less, or low mass neutrinos.

First generation

Quarks: down and up quarks

Leptons: electron (e) and its neutrino

Second generation

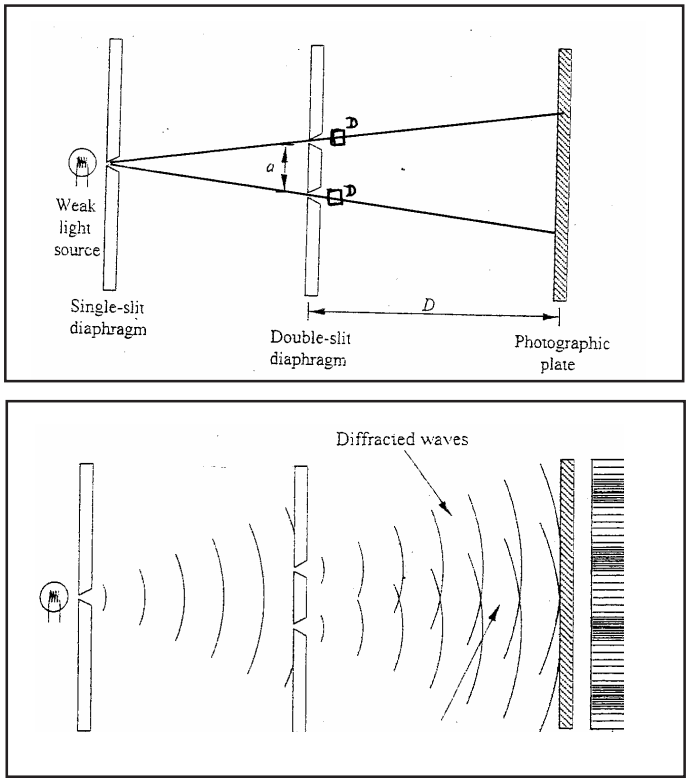

Fig. 7.2 The double slit experiment showing that photons (or electrons) act as particles when they are observed by particle detectors (D), giving the characteristic spots on the photographic plate (above), and waves when they go unobserved (below) giving rise to the well known interference pattern due to waves, proving the duality of behaviour of elementary particles.

Quarks: strange and charm quarks

Leptons: mu meson (μ) and its neutrino

Third generation

Quarks: bottom and top quarks

Leptons: Tau (τ) and its neutrino

These six quarks come in three colours (red, blue and yellow) making them 18 in all. The 18 quarks and the six leptons (and their antiparticles) sum up to 48. Gluons act as their carriers and there are eight of them. To this when we add the carriers of electromagnetic force i.e. photons, $W^{\pm}$ bosons and Z^{0} , the total goes to 60. These sixty particles make the whole Universe. To this may be added graviton, the anticipated carrier of gravitational field, not yet discovered.

The six types of quarks are named as up, down, top, bottom, strange and charm.

Coat of Arms chosen by Niels Bohr

Fig. 7.3. Pictorial representation of principle of complementarity, indicating that contrary is complementary, based on Chinese concept of Yin and Yang. This was used as coat of arms by Neils Bohr to describe phenomena in Quantum mechanics.

But "up" does not mean up in the colloquial sense, nor "bottom" means bottom but they are just names. All the names mean is that they are different from each other. Like wise they have been given quantum numbers called colour and flavour, which have nothing to do with their literal meaning. Colour actually means a type of force and flavour means another attribute. So when we say a quark has a colour (usually red, yellow or blue) it simply means that they experience a kind of force, called the "strong" force but to a different degree because they are different, i.e. have different attributes. Similarly gluons do have different flavours again meaning different attributes. What these attributes are in the context of common sense is debatable or rather inexpressible. But the main point of this discussion is that as we go to finer and finer constituents of matter, new attributes come into play and the number of attributes increase. This seemingly agrees with the principle of *Anekāntavād.*

Some Quantum phenomena can not be described in a language, they appear "crazy and illogical", and can not be comprehended by common logic. Generally all we can say is that perhaps, in this context, it is like that, a concept similar to *Syādvād*. Some of these states can not be described with certainty or can not be described at all and thus seemingly agree with the concept of *Saptabhangi.*

New principles were developed to define the behaviour of particles in the microworld. The principle of symmetry and complementarity seem to play some role in the macroworld too but in the micro world, we have, in addition, the Heisenberg's Uncertainty principle, Pauli's Exclusion principle, Entanglement and some others. Before we discuss the quantum behaviour, we will briefly introduce some of these principles which have helped us in understanding the nature of the universe.

1. Principle of Complementarity
2. Principle of Symmetry
3. Uncertainty Principle
4. Exclusion Principle
5. Entanglement

Principle of Complementarity

The principle of complementarity implies that opposites are complementary and, together they describe the real world. Neils Bohr who propounded the basics of quantum mechanics had great difficulty explaining it, and he did it through the principle of

Complementarity, considered to be the most revolutionary and significant concepts of modern physics. The Western philosophers and scientists had a lot of difficulty in understanding and developing quantum mechanics. Some experiments gave contradictory results, implying that sometimes light or a photon (or electron) behaves like a compact object i.e. a particle (like a solid ball) and some times like a wave such as a ripple we see in a pond. In the famous two slit experiment (Figure 7.2), a beam of photon shines through two slits and hits upon a photographic plate behind the slits. The experiment can be run in two ways: one with photon detectors right beside each slit so that the photons can be observed as they pass through the slits and /or without detectors so that the photons can travel unobserved. When the detectors are in use, every photon is observed to pass through one slit or the other and the photons essentially behave like particles. However, when the photon detectors are removed, a pattern of alternating light and dark spots, produced by interference of light are observed indicating that the photons behave like waves, with individual photon spreading out and surging against both the slits at once (Fig. 7.2). The outcome of the experiment then depends on what the scientists want to measure i.e. the properties of particles or waves. But how do photons "know" or realize that they are being observed by the detectors remains a mystery. In the living world, change of behaviour when being watched is a well known psychic phenomena but change of behaviour in the material world is baffling. Does it mean the particles have a psyche? Scientists don't agree with this interpretation but have explained it on the basis of plurality of attributes.

This dual behaviour of a photon could not be reconciled because of the basic nature of waves and particles were considered to be exclusive or different from each other. Bohr explained this by saying that contradictory behaviour is complementary and used the Chinese concept of Yin and Yang (Fig. 7.3), which are both opposite but exist together and are required for sake of completeness. This is easily understood in the framework of *Anekāntavād* (Chapter 3) which accepts that opposites and extremes allow us to learn the true nature of reality. As propounded in Jainism, reality can manifest different attributes at different times. It may be noted that, in contrast, Buddhism avoided extremes and Buddha favoured the path of the 'Golden Mean' to reconcile contradictory views. This is a fundamental difference between Jainism and Buddhist approach, but we will not go into this aspect here. Complementarity thus became the corner stone of quantum behavior.

Principle of Symmetry :

Nature loves symmetry. Symmetry has been the backbone of understanding nature. The life forms, galaxies, planets, trees, minerals, molecules, atoms etc are all symmetrical. There are many forms of symmetry. Left and right symmetry, mirror symmetry, time symmetry and so on. The conservation laws, on which both classical and quantum physics are based are an outcome of the symmetry principle. Elements (Mendeleeve's Periodic Table of elements) are arranged in eight fold symmetry. The 118 elements can be arranged in the form of octets, their properties repeat after every eighth member and so are the elementary particles. In fact, symmetry principle has been used as a powerful tool to predict the existence of many unknown particles by Gellmann, a Nobel Laureate and a profound thinker. He arranged the elementary particles in "eightfold way" and was eventually able to predict and discover quarks, the smallest constituents of matter known to day. It is known now that elementary particles (called hadrons) can be organized in octets (8) and decuplets (10) whereas leptons in nonets (9). The universe itself is known to be formed by supersymmetry.

Some times symmetry is also violated. Parity, an attribute of a nucleus, for example, is a mirror symmetry which is found to be violated in certain reactions. Thus existence of symmetry and its violation, both are of fundamental importance in understanding the nature of the basic processes governing the behaviour of fundamental particles.

Uncertainty principle:

Applicable mainly to the microworld, the Heisenberg's Uncertainty principle states that it is impossible to completely quantify all the parameters describing the state of a particle precisely. If measurement of some physical quantity is made, then according to quantum physics, the state of the particle is deemed to have changed instantly into a different state. It is not because of limitations of the instruments or their precision that one can not measure the parameters accurately but that the measurement can not be made without changing the state of the particle. For example, both of the parameters in the coupled (conjugate) pairs of energy (E) and time (t), or position (x) and momentum (p) can be known only within some minimum uncertainty Δ: $(\Delta E \Delta t \geq \hbar; \Delta p \Delta x \geq \hbar)$, *defined by the Planck's constant* $h(\hbar = h/2\pi)$, which is quantum of action and is very small (6.625×10^{-34} joule.sec.), but none the less, has finite value. Uncertainty principle is one of the fundamental principles

applicable to the realm of all the physical microworld. This can also be extended to the realms of consciousness (jiva) because consciousness of the observer (or *jyātā*) is changing all the time by interaction with matter (fig.6.1).

The transfer of knowledge from the object to the knower changes both the object and the observer. This is precisely what happens according to the Uncertainty principle so that with every measurement, the object changes and it is not possible to determine its state completely. The Heisenberg's Uncertainty principle is silent about the knower. How does the measurement of an attribute of a physical object will change the state of the knower (*jiva*) has not been investigated by physics but Jainism asserts that any observation instantly brings about a change in consciousness.

Now let us frame the question in another way! If I hold "a particular perspective" of a thing or "concept", is it a limitation of my consciousness or it is the way the object reveals it to me. I take the premise that the human consciousness has no limitation of comprehension and is capable of conceiving many or all the perspectives at once . It is the object which exhibits different perspectives at different times, in different contexts. In other words "multiple perspectives" is the inherent quality of an object of the physical world. Thus *Anekāntvād* is not simply a multiview perception theory but indicates that reality manifests in multiple ways, sometimes at the same time. It is not a limitation of consciousness that it has limited capability of perception of the physical world . Neither it is looking at an object from different perspectives but that the object itself exhibits multiple perspectives which can not all be known at the same time, even by the Omniscient *Kevalis*". Thus , in the physical realm, *Anekântvâd* is as fundamental as the Uncertainty Principle, which states that some properties can not be measured accurately, because of the inherent nature of the behaviour in the microworld.

In a broader perspective, the Uncertainty Principle offers a choice, though limited, in behaviour of nature. In the domain of biology, such uncertainty can allow evolutionary changes. The uncertainty in energy levels, for example, provides a scope for a variance in chemical reactions, leading to different products and thus bring about evolutionary changes.

Exclusion Principle:

The Principle, first enunciated by Pauli states that two elmentary particles in the same "state" can not exist at the same place. No body can state it better or more

rigorously or elegantly than Kabir, when he, after he gained enlightenment said " When I am there, God is not there and when God is there I don't exist, because the space is too narrow to accommodate both of us (who are in the same state).

Separately, the various quantum numbers may describe only a part of the reality, but taken together they described the whole. In the microworld, we encounter two other phenomena which have some relevance in the present discussion: confinement and entanglement. The property of "confinement" of quarks in the quark-gluon plasma has been observed. Simply stated, quarks can not be isolated and can not exist in free state as particles, just as the soul can not exist without a body in a free state in this world. They remain confined in the gluon plasma like the soul is in the body. It will only be speculative to think of what other attributes will be observed as one goes to further finer constituents of quarks, if there are any.

Entanglement

Entanglement implies that all the particles in the universe, produced in the same process, behave in an inter-related manner, Briefly stated, when two systems of particles, of which we know the states, enter into temporary physical interaction due to known forces between them, and after a time of mutual influence, the systems separate again, then they can no longer be described in the same way as before. By interaction, the quantum states have become entangled. All the particles in the Universe were produced together at the time of Big Bang and therefore they are all entangled in some way. Conceptually it is similar to the Buddhist theory of ***Dependent-origination*** or *Śunyavād* discussed above. Nothing is independent in the universe. This is what we have basically learnt from physics that everything and every process in the universe, howsoever trivial, affects everything else or from chemistry that some thing of everything exists in everything.

Greenstein and Zajonc in the quantum challenge exemplify another aspect of micro world of atoms. In the gross world, if we hit a ball on a wall within a room having two windows, the ball can go out only through one or the other window. In the quantum world, when an electron, proton or neutron his a barrier with two or more holes, they can go out of all the holes simultaneously. Notions of causality and of impossibility of being at the several locations simultaneously at the same time are shattered by the quantum theory. This is called the phenomena of superposition of being at two places at once and is related to the phenomena of entanglement. It breaks down our perception

of spatial separation.

The quantum mechanics allows us to create the whole universe out of nothing because virtual particle pairs (matter and antimatter) can be created out of nothing (vacuum). The whole universe is virtual, created out of nothing, as Shankara said and the modern science agrees with this concept, at least in pronciple. Yet there are laws that govern the quantum processes and there are principles which can not be violated. It is debatable whether any of these principles which are applicable to subatomic processes are also applicable to the soul, which apart from being non-material, is infinitely fine (ati-*sukshma*).

Thus we have seen that in the microworld, where quantum physics is applicable, particles show particle-wave duality. Wave mechanics give probability of a particle being present at any location but it can materialize when looked upon by an observer. A spreadout wave, when observed, suddenly becomes localized and become a particle. Thus we can say that looking changes possibility in to actuality. A quantum of light, for example, has no attributes till a measurement is performed. Quantum non-locality extends not only over space but also over time. Thus we can say that in quantum world, there is neither space nor time unless consciousness has chosen to collapse an event. We can invoke consciousness to explain delayed choice experiment, in which the particle changes its behaviour at the nick of time, even after it has already set out on a path, long ago, but no physical proof of "consciousness" has been found. We have also seen that two correlated photons are phase-tangled. Non-locality means communication or influence without exchanging signals through space-time and although non-locality of correlated photons can not be used to transfer information, they are in some kind of "communication".

Some similarities between physical and sentient phenomena can be found. It is well known that looking can change the behaviour of sentient beings. It is claimed that joint meditation together can make the minds correlated or tangled and as a consequence, "intentionality" of one can be affected by the other. In case of correlated brains, consciousness is involved in establishing and maintaining correlation. It is possible to transfer thoughts (telepathy) in this state. To agree is to vibrate in phase in quantum correlation.

Quantum physics may not be the end of physics. One can speculate that even finer "particles" will be discovered as science progresses where not only duality but even tri-ality involving particles, waves and consciousness may have to be invoked to

explain various phenomena. Or even multi-ality (*Anekāntavād*) may come into action where more attributes would come into play.

Science Sūtras

Having pointed out that some of the laws which operate upon the gross universe and the microuniverse are different, and nature follows some principles, we briefly summarise the basic understanding of physics in the following Sūtras:

1. The processes occurring in the physical universe are deterministic in the sense that they all obey certain laws.
2. These laws are universal, applicable at all places, at all times and govern all processes.
3. The universe can be divided in two parts, the macro (gross) and the micro (fine, sukshma). The laws governing these two regimes are different.
4. The macro world as well as micro world is symmetric in nature in most attributes.
5. The macro (visible to eyes and telescopes, as big as they can get) follows the laws of classical mechanics. The governing law is that the whole is the sum of parts. This is the law of addition of various properties of the gross world, like mass, volume, and parameters of motion etc.
6. In both regimes, mass (M) and energy (E) are inter-convertible given by the simple relation $E= Mc^2$, where c is the velocity of light. Mass can take many forms and so can energy but the sum of mass and energy of a system is always constant known as the "law of conservation".
7. In any transformation, laws of conservation are obeyed. Energy can never be destroyed or created.
8. Conservation laws are applicable to energy, momentum, charge, symmetry and a large number of other attributes.
9. Time always moves in forward direction. This arrow of time is determined by increase in entropy (disorder).
10. The micro world (molecules and smaller entities i.e. atoms, elementary particles, as small as they can get) is governed by quantum mechanics. Some laws of classical physics are not valid in this regime.
11. In the micro world, new properties (attributes) come in to play. One such attribute

is duality i.e. the same particle, such as photon, can behave as matter or wave at different times. It is possible that as one goes to finer and finer particles, new attributes (called quantum states) will arise.

12. In the micro world, particles exist in certain discreet states. There is no continuous transition from one state to another but any change is a quantum jump.

13. Some of these attributes may be contradictory. Contradictory properties are in fact complementary and enables us to understand the nature of the whole.

14. Processes in the micro world follow certain principles: These are Principle of Uncertainty, Exclusion Principle, entanglement etc.

15. Uncertainty principle requires that some of the attributes of a particle (like position and momentum or energy and time) can not be simultaneously measured with precision. This is not a limitation of the observer or measurement but a fundamental law which prohibits precise measurements of both the parameters in a coupled set.

16. Exclusion principle ensures that two identical particles (identical in all the attributes) can not coexist at the same time at the same place.

17. Entanglement ensures that all the particles produced in the same process influence each other, no matter where they are.

18. The whole universe can be built by 61 "elementary" particles which are basic building blocks of matter. These include four carrier particles (photon, graviton, $W^{\pm}$ boson and Z^{0}). Quarks and gluons are the smallest particles known so far.

19. Certain "Forces" operate on any material particle in the universe. There are seven forces in all. Electricity, magnetism and gravitation follow the inverse square law. Nuclear forces are of two types, weak and strong. Electricity, magnetism and weak nuclear forces are manifestation of the same basic force called electro-weak. Thus we are left with three basic forces: Electro-weak, strong and gravitation. These may all possibly be manifestation of a single force resulting in a Grand Unification theory of all the forces of nature.

20. Under the influence of the strong nuclear force, elementary particles combine to form aggregates. They, in turn, combine to form protons, electrons and neutrons, which make atoms and atoms combine to form molecules. Molecules combine under the influence of electromagnetic forces to form compounds and compounds

form minerals. Minerals form rocks and rocks, under the influence of gravitational force, form planets, stars and galaxies (see Chapter 9 for the theory of association and dissociation).

21. Presently the universe is made of 4% matter, 20% dark matter and 74 % dark energy.

22. Space and time form the four dimensional universe but the universe may have more dimensions.

23. Velocity of photons is the highest speed material particles can achieve. This is the basic principle of Special theory of Relativity.

24. The present Universe, which is expanding, was created in an explosion, called Big Bang, 14 billion years ago.The previous history of the Universe is not known but it would fit in an oscillating Universe, successively going through expansion and contraction. Or may be the Universe is in some kind of overall "Steady State".

In summary, the basic constituents of the physical universe are Mass (and Energy), Space and time and the three forces (Electro-weak, gravitation and strong).

We have discussed the major scientific concepts and summarized them in this style of Sūtras so that they can be directly compared to Jain thinking. We now turn to Tattvartha Sūtra (chapter 5) where some of these aspects are mentioned to see what is common between science and Jainism.

Jainism believes that the Universe (material world) is real, perceived by mind through senses, which are not perfect and still evolving (Chapter 1). When mind perceives an object or a process, what is real? The object, the mind which perceives (acts like a mirror) or the perception? In the ultimate analysis, matter has many attributes (*Anekāntavād)*, all of which can not be perceived at once. Furthermore, the mind perceives an object or a phenomena based on its past experiences so that it is conditioned by the past perceptions and need not be perfect. The perception depends on the observer and as the consciousness evolves, the perception comes closer to truth (say from the perception of an ant to that of an elephant to that of a human). Only in case of a *Kevali* (omniscient) their perception, being supersensory and not depending on the imperfect sensory organs, is correct.

Jainism postulates that the finite *Loka* (Universe) is immersed in an infinite *Aloka*.

The Universe consists of two group of entities *Jiva* and *Ajiva*. Ajiva consist of five "substances": *ākāsh* (space), *Dharmāstikāya*, *Adharmāstikāya*, matter and time. The extent of these six basic "substances" define the universe and they all are eternal and inexhaustible. Jiva (psychical or sentient beings), and matter (*Pudgalāstikāya*) are active, i.e. capable of interacting, corporeal and mobile, and others (*Ākāsh*, *Dharmastikāya*, *Adharmastikāya* and time are passive or inert, are coexisting, and do not interfere with each other. "Substance" here does not mean "matter" but is taken to mean as basic constituent, *Dravyas*, reals or "varities[1]". A*kāsh* is not considered to be cosmic space but something which provide abode (space) to these "substances". Substances are subject to modification and can exist in various modes (forms). *Ākāsh*, *Dharmāstikāya*, *Adharmāstikāya* and time by themselves are incorporeal and stationary (motionless). *Ākāsh*, *Dharmāstikāya* and *Adharmāstikāya* are single entities, homogeneous, isotropic, uniform and indivisible. *Ākash*, matter and time are made of infinitesimal indivisible units and *akāsh* is homogeneous in all directions. The smallest unit of *Ākāsh* is called *pradesha* and of matter is called *Parmānu.* A *parmānu* is dimensionless. One to infinite *parmānus* can occupy one *pradesha*. *Parmānus* or their clusters constituting matter have corporeal properties like touch, smell, taste and colour. *Parmānus* combine to make *Varganās* as discussed in Chapter 10 and give rise to various types of matter, their properties and powers.

Science agrees with existence of Space (*Ākāsh)*, time and matter being the substances of the Universe and the Universe is expanding. Expanding into what?, one may ask. In to space surrounding it and if the Universe is going to expand for ever, the space surrounding it has to be infinite. But "Space" of modern cosmology is distorted by gravitational field and itself expands, according the current theories of the Universe, and is not strictly the *Ākāsh* of Jainism which is passive and can not expand or contract or get distorted in any manner. This subtle difference between Space and *Ākāsh* is significant. The other two constituents are *Dharmāstikāya* and *Adharmāstikāya.* In Jainism, they are traditionally considered to be media of motion and rest respectively. Their equivalents in science are not known. Their existence can possibly explain the origin of "inertia" and can be the cause of first law of motion, according to which a body continues to be in uniform motion or condition of rest (unless acted upon by an external force), since *Dharmāstikāya* will facilitate motion and *Adharmāstikāya* will ensure that a body continues in a state of rest. Matter has form and energy has no form but the contradiction in shloka 5.3 and 5.4 of Tattav*ā*rthsutra can be resolved if matter can have form and is also formless, if we

consider the interconvertibility of matter and energy.

Nityavasthitāny arupāni ca (5.3)

Rupināh pudgalāh (5.4)

Could *Dharmāstikāya* and *Adharmāstikāya* be kinds of entities from which various forces emerge? Attempting to find agreement between science and Jainism, we may speculate that the three known forces (gravitation, electroweak and strong nuclear) can possibly originate from two entities, one a source of motion and the other resisting motion to fit the description of *Dharmāstikāya* and *Adharmāstikāya*. Since much effort is being made by scientists to unify all the forces in one, this speculation can be a subject of further investigation.

Jainism divides matter into six categories from gross to subtle. The examples given are Earth, water, light and shadow, smell and taste, *Karmānu*, and *Parmānu* respectively. There is some conflict in the order of subtleness in this sequence in view of our scientific understanding but we may agree with the end members of this sequence from grossest Earth to the subtlest *Parmānu*.

There are areas of geography (Jambu dweep etc, Chapter 2 of Tattvārthsūtra) and astronomy (Sun, Moon, Universe etc, *Surya* and *Chandra Prajnapti* and chapter 3 of *Tattvārthsutra*) which have major disagreements with our current understanding. The observations, as far as geography of the earth and astronomy of solar system and Milky Way etc are concerned, are firmly based on remote sensing and telescopic observations. There is no scope of modifying them and therefore the discrepancies existing in scriptures need to be corrected. Some of these aspects are mentioned in Appendix 1.

Having considered the physical universe from the view point of modern physics as well as Jainism, we now turn to *jiva*. Whether these laws applicable to subatomic particles are applicable to soul, which is infinitely small and fine is not clear. We consider three principles here: *Anekāntvād*, Mach's principle and Entanglement. *Anekāntvād* is equally applicable to microworld as well as sentient universe. We have already discussed above (as well as in Chapter 3) the similarity of *Anekāntvād and Syādvād* with quantum mechanical concepts in the domain of physical universe.

Mach's Principle and Ahimsa

Although Newton's laws of gravitation are well formulated and understood, we

do not yet know how the inertial mass of a body comes into existence. Ernst Mach gave some idea on this vital question by proposing that the inertial mass of a body is solely due to interaction of other bodies in the universe (see e.g. Barbour and Pfister, 1995). The implication of Mach's principle is that inertial mass cannot exist in isolation. Now we may ask if this principle can be extended to *jiva?* We are living in a mutually and totally interactive world and nothing is independent of the other. This is true for life (*jiva*) or soul. Life certainly cannot exist in isolation. If all living species, except one, in the universe or even on Earth, or even in a country or even in a society vanish, the last one also will not be able to survive. If all the bacteria in our body die, we will also not survive. Every bacteria, every cell is vital to our existence. We exist because of them. Therefore the life is a result of interdependence (or interaction) with other living species. This is the essence of *Sunyavād* according to Nagarjuna and implies that one is nothing (*Sunya*), without life in the rest of the Universe. Zero or *Sunya* is a complete circle, complete, full and wholesome like the self but, without others, its value is zero. Its value is only contextual. Self is similar. It is complete but it has no value or existence without the rest of the life in the universe. Mach's principle for material world (mass) is the same as *Sunyavād* in the living world. The principle of non-violence immediately follows from the above discussion since the whole becomes a cause for the existence of a part of it (and vice versa) and both, the whole and the part ,are indistinguishable. In effect, when, one does any harm or kills some body, howsoever primitive, one is actually killing a part of one self, because his very existence is interactive in nature and depends on others. It is like committing suicide to a minor extent. Thus the inertial mass, which is a physical entity and the consciousness, which is a spiritual attribute, are both interactive in nature and their origin is a consequence of interaction with the rest of the Universe. We will return to this argument at the end when we discuss entanglement.

Parasparopgraho jivānām *and entangled souls*

Entanglement is superposition of states of two or more particles, taken as one system.Two particles, which are miles apart or in opposite parts of the universe, behave in a concerted way. What happens to one of them affects the other instantaneously, regardless of the distance. Thus entanglement can transcend space. The same principle is valid for sentient beings and all *jivas* are entangled. In practice it implies that the best way to help one self is to help others.

We have discussed various aspects of Jainism and modern physics and find that there is some common principles involved in both. We thus see that by properly

amalgamating Jain concepts with concepts of modern physics, it should be possible to ascertain the true nature of reality and make further predictions. *Anekāntavād* can be applied to test many predictions of modern science and may have a role to play in making a correct choice between different possibilities. We end this chapter by summarizing these areas of agreement and disagreement.

Jainism divides the universe into *Jiva* (soul) and A*jiva* (matter) and treats the whole universe as an interplay between the two. Everything in the Universe, howsoever trivial, exists for the sustenance of the *jiva*. Nothing is useless as far as the *jiva* is concerned. Jainism asserts that both, *jiva* and *ajiva*, are governed by certain laws which are eternal, universal and can not be violated. Science deals with only the matter and asserts that they are governed by laws of physics, which are universal and can not be violated. *Anekāntvād* of Jains, applicable to both *jiva* and *Ajiva* can be compared

Comparison of some concepts

Jainism	Science
• Karmavad	• Causality
• Krambadhha paryay	• Determinism
• Anekantvad	• Complementarity
• Syadvad	• Uncertainty
• "Parasparograh Jivanam"	• Entanglement

with the principle of complementarity found to hold good for micro particles and is a basic concept in quantum physics. *Anekāntvād* in fact goes much beyond complementarity, i.e. instead of just two aspects, it considers infinite aspects. Jainism divides the universe in knower and the known. Both interact through knowledge, which affects both of them. Physics deals with the knowable objects through observation (knowledge) and asserts that observation modifies the object in some ways. This has led to the principle of Uncertainty, postulated by Heisenberg. In comparison, Jainism asserts that knowledge, or measurement modifies both the knower and the known, which of course is true in everyday experience. One of the fundamental aspects of Jainism is *Karmavād*, which is equivalent to Causality in physics; only it is applicable to

sentient as well as non sentient, both. This law has led to determinism in physics, that every thing is predetermined, since it follows the laws. This is equivalent to *krambaddha paryāy,* a kind of determinism in sentient world. The question of origin of inertial mass in physics led Earnst Mach to postulate that the mass in a body arises because of the mass present in the rest of the universe. Their existence is mutual. This is equivalent to the one of the basic principles of Jainism *" Parasparograho Jivānām"*, which has been reinterpreted here to mean that life at a place exists because of the presence of life in the rest of the universe. This is also similar to the concept of *Sunyavad* in Buddhism, as discussed above. *Sunya* is complete in all aspects, whole in itself. Everything in the universe, be it an atom, earth, moon, stars or galaxy is spherical or circular, like zero or *ṣunya*, complete in itself. But the value of *ṣunya* is zero, i.e. nothing till it is placed in context with some number (say 1). Once placed in context of another number, not only it acquires a value of significance, the value of the other number enhances ten fold. The same is true of Self. It is complete but is nothing till it is placed in the context of the universe or life elsewhere. This, according to Nagarjuna as discussed above, is one of the interpretation of *ṣunyavād*. One exists because of the others, otherwise one is nothing.

This Sūtra can also be considered as equivalent to the principle of entanglement, applicable to souls. These principles immediately lead to the principle of non violence, because if our life depends on others and all the souls are entangled, every life should be protected.

Although the universe is an interplay between *jiva* and *ajiva*, it is the *jiva* (self) which controls and directs the behavior of *ajiva*. The presence of *jiva* (*ātmā*) in the material (inanimate) body controls the body functions with the definite purpose of its sustenance. It has been proposed that the same is true of the whole earth and indeed the universe. Imagine the whole world as a large organism with living species and non living (matter). The geologic evolution of the earth (such as, for example, the change from reducing environment containing ammonia, methane, carbon di oxide etc in the beginning required for primitive life to oxidizing atmosphere containing 22% of oxygen required for life of higher order) tells us that it has evolved or changed the environmental conditions in sync with the requirements of life so that the life may survive and evolve. This hypothesis, called "Gaia" proposed by the British astronomer Lovelock has very profound implications to the interaction between *Jiv*a and *Ajiva*. The same hypothesis can be extended to the whole universe where the "*Brahma*" (or self) dictates all the physical processes to suit its own requirements and the whole universe can thus be

considered as a mega-organism, every part of it working for the sustenance of the supreme *Brahma*. Buddhist cosmology goes a step further when it postulates that an appropriate Universe is created automatically and spontaneously where souls can undergo the consequence of their past *karmas*.

Based on the various points discussed in this chapter we find that there is some common ground between modern science and Jainism. Some of these aspects are listed in Table 7.1.

We see from this table that there are a few areas where physics and Jainism have basically the same views and apparently agree. However, it may be noted that there are many important areas where there is a serious conflict between them. We mention a few such examples here. Jainism believes that the universe is eternal, grossly never changing on a gross scale, that is similar to Steady State universe, whereas science asserts that it originated in a Big Bang. Whether the Universe is a Big Bang universe, Steady State universe or oscillating, cyclic universe is a continuing point of debate. Some of these aspects are discussed in the next chapter. Science has postulated basic constituents of the Universe as space, matter (and energy), time, forces and fields. Jainism agrees with the first three, i.e. Space, matter and time but has postulated *Dharmastikāya* and *Adharmastikāya* as the other two components, besdies *jiva*. These are called the six *reals* constituting the Universe. Jainism classifies matter in six kinds, varying between gross and fine whereas science classifies matter into macro and micro; the macroworld follows classical physics and fine matter (microworld) follows quantum physics. Both physics and Jainism believe in laws of conservation applicable to certain quantities. For example, Jainism asserts that quantity of the six constituents of the universe, mentioned above, is constant and can not be changed under any condition.Whereas science considers matter (energy), momentum and several other parameters are conserved in all changes. Science is working on the hypothesis that life can arise from matter but Jainism considers both as independent *reals*, one can not be produced from the other and both are eternal. It should be emphasised that scientific concepts are correct since they are based on observations, and even admitting that some of them may be partly incomplete and subject to further modification, as more observations are made and theories are perfected, it is hard to find an agreement between many Jain and scientific concepts.

Surely there are areas of serious disagreement between Jain description related to geography and astronomy, units of time and space and the modern observations, an area in which science has made tremendous progress. They can not be reconciled and

obviously Jain concepts need to be corrected in light of modern scientific findings. Some of them are mentioned in Appendix-1.

8

Jainism, Mathematics and Cosmology

God did not have to create each and everything.
All He had to do was to make laws and everything followed by itself.

Philosophy, culture and mathematics are intimately related to each other and each of them builds upon the concepts of the other as is well reflected in ancient Indian thought. Jain scriptures mention that the counting system and script (called *Brahmi lipi*) were evolved in ancient times by their first Tirthankar Rishabh Dev. The roots of ancient arithmetic and geometry are documented in the history of Babylonia (going back to 5700 BC), Egypt (4000 BC), Sumeru (2500 BC), and Greece (600 BC) where calendar, weights and measures etc evolved. But formulation of numbers (0 to 9) as we use today and the decimal system was conceived in India. These developments gave a powerful tool to ancient Indian mathematicians in developing several new concepts and in attaining high level of precision in calculations. The discovery of Zero, attributed to the Indian mathematician Pingal (about 200 BC) and decimal system, more than anything else, has laid the foundation of modern physics, astronomy, cosmology and computers. Some scholars believe that the discovery of zero owes much to the concept of *Sunyavād*, an important tenet of Buddhism and Hinduism. Jains were the first to conceive infinity and to recognize that there are many kinds of infinities. Indian mathematicians, specially Jains applied the mathematical concepts of

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1.The *Nāadiya sukta* in Rig-Veda ponders over the question of what was there in the beginning, before water, air, light and earth, Universe and Gods came into existence. The possibilities are full of uncertainty and contradictions such as there was neither non-existence nor existence then; no death, no immortality; no day, no night; no above, no below etc; Who really knows, it asks? Perhaps it created it self, perhaps it did not. May be it was the *Hiranyagarbha*, the primal nucleus. Perhaps He who looks from the highest heavens knows or even he knows not, it says. Very thoughtful ideas and philosophically this is an impressive way to describe the beginning even today since, as will be discussed, according to Jainism, uncertainty and complementarity of contradictions is the basic nature of the Universe.

zero, infinity etc not only to cosmology, astronomy and geography but also to philosophy and culture (e.g. see *Ganit Sār Sangrah* by Mahvirāchārya, 9th century A.D.). For example, infinity was much used in the spiritual domain as some faculties of pure soul are infinite knowledge, infinite potency (infinite *Jnān*, infinite *Virya)* etc discussed in Chapter 2).

In the ancient times, the concepts of decimal (and the power of 10) systems made it easy to handle large numbers and enabled the mathematicians to comprehend the vastness of the universe. In many cases they obtained realistic ideas such as in the case of dimensions and age of the universe and other large structures like galaxies. However, in the light of the recent progress in sciences and observational techniques, it appears that several ancient deductions related to geography, solar system and planets were erroneous (Appendix-1). It is not the purpose of this chapter to go in to the history and priorities in arithmetic and geometry but to discuss some concepts which may still be relevant.

The number system enabled ancient Jains to define vast sets of units of time and space, although they did not use decimal system and preferred some kind of binary or other *adhoc* (multiples of six or eight) systems. Jains divided numbers in to three types, enumerable (countable), innumerable (uncountable, *Asankhyāt*) and infinite (*Anant*). Infinity is something which has no boundaries. *Asankhyāt* (innumerable) is a unique concept developed in Jainism and defines a number with flexible boundaries. It is strange that some number are considered innumerable (*Asankhyāt*), because the power system, already known, enables one to count any number, howsoever large or small it may be, so that there should be only two types of numbers, countable and infinite, as is currently accepted. Value of *Shirsh Prahelika* determined to be 10^{250}, calculated accurately to 70 digits is mentioned and is probably the largest number we encounter in Jain scriptures, although we do not know its significance. *Asankhyat* is also used in connection with the units of time (*samay and avalikā*) which themselves are very small. It is mentioned in *Tatvārtha-rājavartikā* that it is not in the power of even the omniscient to know the *asankhyāt* number precisely. We attach deep philosophical and scientific connotation to the innumerable. We take the view that the number of entities can not be counted, only if the entity is continuously changing its properties and is indeterminable. We interpret innumerable as not necessarily a very large or very small number but as a number which can not be determined because the number of entity is changing at every instant. Such examples do exist in physics. Due to particle–wave duality, the number of particles in a box can not be precisely counted;

only their probability can be estimated. This will imply it to be innumerable or *asankhyāt*. This brings us to the Uncertainty Principle discussed in the previous chapter. Heisenberg found that certain parameters (like energy and time; location and momentum of an elementary particle), both can not be measured with absolute precision but within an error related to Planck's constant (h), not because of the limitations of the instruments but because this uncertainty is the fundamental law of nature. Another example of indeterminate number or *asankhyāt* may be the number of protons and neutrons in a nucleus. A nucleus is made of protons and neutrons and on the average it is said that a nucleus of, say oxygen, has 8 protons and 8 neutrons. However neutrons and protons are continuously changing from one form to another. This is what the Japanese physicist Yukawa found and proposed an exchange meson called pi-meson. So at any instant it is impossible to say exactly how many neutrons and protons are there in the oxygen nucleus. This we consider is the true meaning of innumerable.

Now this innumerable criteria applies here to smallest units of time (*avalikā*), only bigger than *Samay* (innumerable *Samay* make one *Avalikā* and *Avalikā* $=1.717 \times 10^{-4}$ seconds, according to N.M. Tatia). It is strange that the Jain time units stop at *avalika* and then jump to *Samay*, the smallest unit of time. In comparison, *Avalika* is quite large compared to Planck time (10^{-43} seconds) used in connection with the Big Bang origin of the universe below which there is some uncertainty in the physical processes occurring there. On the other hand, innumerable is also used in case of units of large space. If we consider large size of the universe, the universe is finite with volume of 343 cubic Rajjus but a Rajju is made of innumerable Yojans $\times 10^{14}$) and thus Rajju is indeterminable in absolute sense, although according to some scholars its value varies between 10^{15} to 10^{22} km).

Cosmology

Origins, i.e. origin of life, origin of universe, origin of earth etc are fundamental questions in philosophy, religion as well as in science. We have learnt from science that every physical process is governed by certain laws, which are well defined and can be mathematically formulated with precision. These laws can never be violated. Origin of everything we see in the universe must have followed certain laws. Thus before there was anything, there were laws. Two questions naturally arise, as to how the laws came into effect and, why are the laws as they are and no different. If every thing is a natural consequence of certain laws, then the question arises as to who made the laws? Are there other universes where laws are different from our universe?

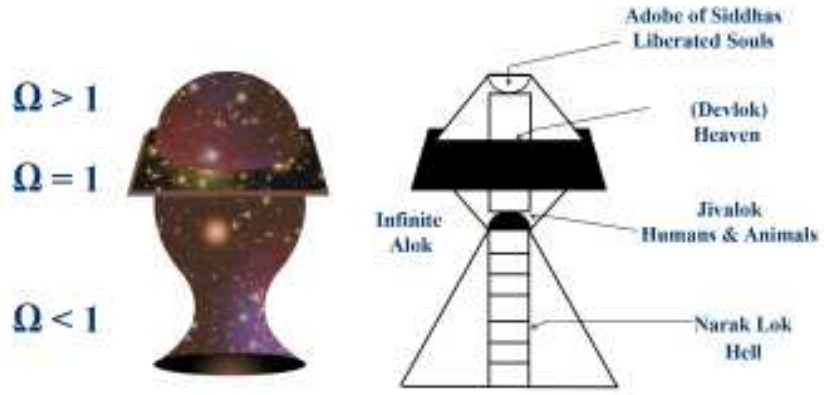
To understand the process of origin or essentially who came first, the universe or

the laws, three possibilities arise

1. Laws were in effect (existing) before the Universe originated.
2. Laws and Universe (and time) came into existence simultaneously, ie at the same time.
3. Laws are eternal and so is the Universe: they have existed at all times in the past and will continue for ever. They did not originate.

The first assumption explains that the universe originated following some laws and not in an arbitrary, *ad hoc* or lawless manner and is continuing to evolve according to the same laws. If time and laws are created simultaneously, there was no time before the universe began and the question as to what was before[1] can be avoided. In this assumption, it is implied that the laws are spontaneous, *swayambhoo*, self created. If laws themselves are created spontaneously, then the law of spontaneous creation is one of the basic law. Once it is accepted that the laws can appear spontaneously out of nothing then there is no difficulty in generating everything else also spontaneously. If the universe and laws appeared together, i.e. they are coupled, arguably laws will also evolve as does the Universe. They are linked and interdependent. Observationally we find that the Universe has evolved over the ages but laws of physics have remained the Universe same. All attempts to see any time variations in basic laws (for example, the law of gravity) have so far not been successful. The laws are universal, applicable at all times and places. The third alternative is that the laws are eternal. If laws are eternal, then why not matter (*ajiva*) and *jiva* too are eternal? This is the basis of the steady state concept of the universe. To resolve the problems stated in the first two assumptions, Jains believe that certain "things" (*Jiva*, *ajiva* and other *tattvas*) are eternal and the universe follows the Steady State model. *Jiva* and *Ajiva* always existed as they are now. There is no origin or creation. But we know that the Universe, the earth and the life has originated and evolved (see e.g. chapter 1) and one day they will also be destroyed. In this respect a Buddhist concept is very appealing. They postulate that *karmas* of sentient beings is the motive force for origination of the material Universe (or at least various habitat planets, like, for example, the earth). Appropriate habitats and their environments are automatically and spontaneously created by nature to meet the requirements of the *karmas* accumulated by the sentient beings so that they can go through their consequences.

To circumvent the problem of origin and destruction of Universe and the changes we see around, Jainism postulates cycles of various types within a steady state Universe. These cycles result in origin, evolution, sustenance and dissolution of various bodies



(a) (b)

Fig. 8.1 a, b Universes with closed $(\Omega_0 > 1)$, flat $(\Omega_0 = 1)$ and open $(\Omega_0 < 1)$ geometry, placed one above the other (left) to match the shape of the Jain Universe (right). The density of the universe determines its geometry. If the density of the universe exceeds the critical density (Ω_0), then the geometry of space is closed and is positively curved like the surface of a sphere (left top). If the density of the universe is less than the critical density, then the geometry of space is open, negatively curved like the surface of a saddle (left bottom). If the density of the universe exactly equals the critical density, then the geometry of the universe is flat like a sheet of paper (left, middle). Thus, there

within the Universe. Some of the enigmatic points framed above are eternal questions and have not been satisfactorily answered. Whether they will ever be understood remains to be seen.

According to Jainism, the universe consists of Loka which is finite and is immersed in infinite space. Jains have given considerable thought to the structure of the universe, its shape, size and units of time and space. Their concept of numbers (a variety of infinities to innumerables to smallest numbers possible) and the precision with which the calculations have been made, comparable to the present day precision, is amazing. It is not however surprising in the land where numerals and decimal system were discovered. Unfortunately there is much confusion in the units of space and time because inconsistencies have crept in the undocumented (memorized) records over several millennia. None the less, the concepts are still preserved and comparison of contemporary astronomical dimensions of the relevant Jain structures may be able to resolve the discrepancies in Jain units of time and space. An added confusion arises

because at places Jains use *devgati* (divine velocity) and calculate the dimensions which bear the same name as the common units; For example dev-yojan and yojan have been mentioned and used to describe certain aspects of the universe. In spite of these difficulties we make an attempt here to describe and compare the modern and the Jain concepts.

Modern Cosmology:

One of the assumptions on which some of the present theories of cosmology have been developed is that the Universe on a large scale is isotropic and homogeneous. It is infinite in expanse and it does not change with time, an assumption known as the Perfect Cosmological Principle.

Theoretical calculations showed that a static universe is not possible and therefore dynamic Universe models (expanding, oscillating etc) have been proposed. Before we try to understand the way the Universe originated it is necessary to define what a Universe is. One way of defining it is that it is the totality of space, time, matter and energy. The *jiva* has no place in the modern cosmology although it is considered to be very important in Jain cosmology.

The most acceptable theory for its origin, well supported by precise observations and theoretical calculations is the Big Bang theory but other models are also possible. The Big Bang model shows that the universe started with a big explosion some 14 billion years ago. There was nothing before this time; even the time was born then.

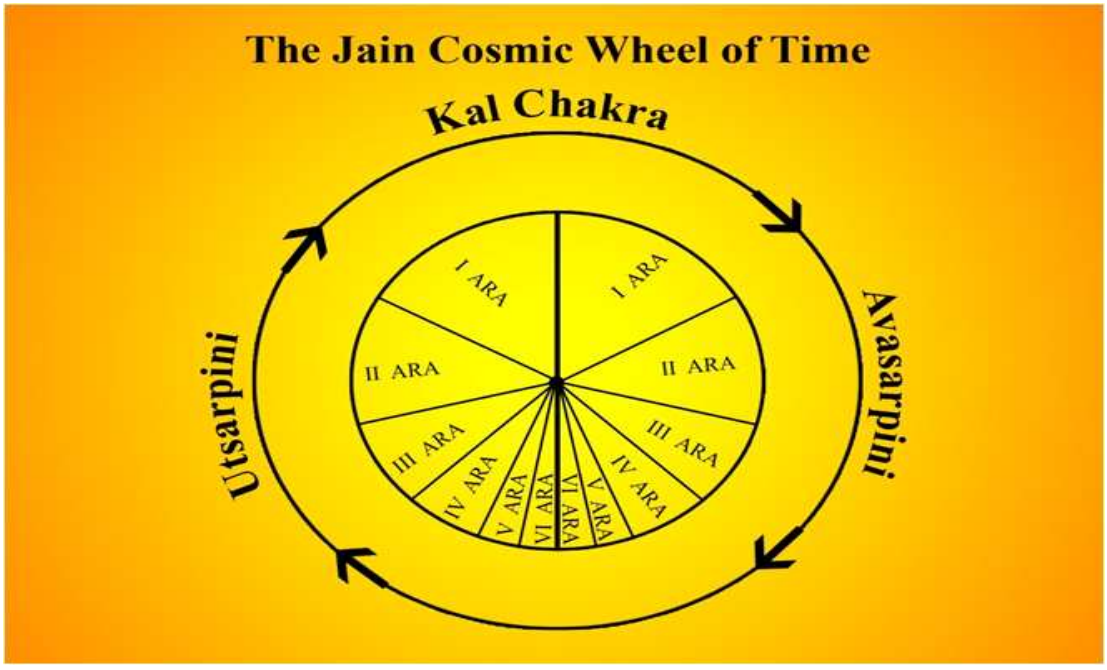


Fig 8.2 Jain Cosmic periodicities

According to the models, the Universe has expanded, cooled and evolved in ever increasing steps of time, sequentially controlled by quantum gravity, electroweak and then strong nuclear forces. The initial 10^{-43} seconds, called the Planck time, was epoch of quantum gravity when temperatures were higher than 10^{32} Kelvin. Then it entered Grand Unification epoch which lasted till 10^{-34} seconds. Electroweak forces dominated up to 10^{-10} seconds and were followed by radiation dominated era. Thus in the beginning there was only radiation, which quickly converted in to matter as space expanded, Universe cooled and time evolved. It took the Universe about 100 seconds after the Big Bang, to enter matter dominated era when fundamental particles were formed. The first to form was quark gluon plasma (see Chapter 7). They quickly froze into protons, neutrons and electrons, which in turn fused into hydrogen, helium and lithium. These particles combined in definite proportions to form matter as manifested today. As the Universe expanded in space and time the reduction in temperature allowed the formation of structures like clusters. The matter so formed was dominantly Baryonic which is what one sees around today. As matter dominated, the cooling became faster and the radiation got decoupled from matter and the universe became transparent. Inside clusters, individual stars formed due to gravitational contraction of Molecular clouds of hydrogen, which by thermonuclear fusion produced all the heavier elements and their isotopes. As the universe evolved, generations of stars formed, evolved and died resulting in varied objects including the solar system and life as we have, that populate the universe today. The radiation which decoupled from matter around 300,000 years after the Big Bang cooled and reached the present temperature of around 2.7 K, exhibiting itself in the present era as a nearly isotropic background radiation in the infra red frequency, as discovered in 1964.

One of the major problems in this scenario is that the laws of physics require that matter and antimatter should form in equal amounts but what we see around is only matter. Where has the antimatter gone? It could form another isolated universe, because matter and antimatter together will annihilate each other.

The universe has been expanding and cooling ever since. In this theory most of the matter was formed in a tiny fraction of a second (10^{-35} seconds to 3 minutes) since the beginning and evolution is slowing down gradually. The first galaxies started forming in a billion years from the beginning. The theory is primarily based on the observations of Edwin Hubble that all the galaxies in the Universe are going away from each other. He found that the light coming from a galaxy becomes redder the farther the galaxy is from us. The shift of light towards red colour occurs when the source is rapidly going away from the observer. Hubble found that farther a galaxy, faster it is moving away from us. The Universe has been expanding ever since the Big Bang and as mentioned before, the temperature of the initially very hot universe has come down currently to 2.7 Kelvin because of expansion over 14 billion years.

Whereas every one agrees with an expanding universe, there have been competing

theories to Big Bang. Fred Hoyle, Thomas Gold and Hermann Bondi, proposed a Steady State cosmology in 1948 but Hubble's observation of Expanding Universe contradicted it. The expanding universe requires creation of matter to compensate for expansion. To accommodate the Big Bag event within the Steady State theory, Fred Hoyle, Geofrey Burbidge and Jayant Narlikar have modified the Steady Stae theory to a Quasi-Steady state Theory. It is possible that the universe is oscillating and the expanding universe is just the current phase which is ultimately going to enter a contraction phase. Then the Big Bang theory, in this scenario is only the last phase of this cyclic "Quasi Steady State Universe".

Simply stated, the shape of the universe is determined by competition between the momentum of expansion and the pull of gravity. The rate of expansion is expressed by the Hubble Constant (H_o) while the strength of gravity depends on the density and pressure of the matter in the Universe. The fate of the Universe is then governed by the density. If the density of the Universe is less than the "critical density" which is proportional to the square of the Hubble constant, then the universe will expand forever. If the density of the universe is greater than the "critical density", then gravity will eventually win and the universe will collapse back on itself, the so called "Big Crunch". However, the results of a recent study suggests that the expansion rate of the universe is actually increasing and not slowing down. One way it can happen is if a form of matter exists which applies a strong negative pressure. This form of matter is sometimes referred to as the "dark energy". If dark energy in fact plays a significant role in the evolution of the universe, then in all likelihood the universe will continue to expand forever.

Recently the temperature of the Universe has been measured using space crafts. The observed density of the universe based on the fluctuations of the microwave temperature is found to be close (within 2% uncertainty) to the critical density, and therefore it appears that the geometry of the universe is flat.

Two things are clear from the observational asronomy. Firstly, everything in the universe is rotating, around its axis and around the centre of the system, be it planets, galaxy or any other object. Secondly everything within the universe is expanding and contracting, in howsoever miniscule manner (akin to breathing), for whatever reason, be it the Sun, Earth, or stars. These two points must be borne in mind when we discuss Jain cosmology because these features are not explicitly mentioned in the scriptures.

Jain Cosmology:

Jains divide the universe in two parts *Loka* and *Aloka*. *Loka*, the visible universe is finite, defined by the existence of the six reals, Jiva, matter, *ākāsh, dharmāstikāya, adharmāstikāya* and *kāl* (chapter 7). Beyond the Loka is Aloka, the invisible universe, which has infinite expanse. Mahendra Muni has discussed the Jain cosmology and compared it with modern cosmology in great depth in his treatise "Enigma of the Universe". Briefly, Jain cosmology is a Steady State cosmology. It assumes that the universe has been always like this, without beginning and without end. The Jain concept of a Steady State-Oscillating Universe is as follows.

The shape of the Jain universe (Loka) is very peculiar (Fig 8.1b). This kind of structure is surely not stable unless it rotates around its vertical axis. But rotation can only be inferred with respect to a fixed frame of reference. If the coordinate system rotates with the Universe, we will not notice it. Also, sharp edges and corners are not permitted in large structures by physics. It may be borne in mind that there is no direction (up or down as mentioned in the scriptures) in space. It is difficult to reconcile Jain Universe with the Big Bang Universe. Some crude agreement between modern and Jain concepts can be obtained if the universe is assumed to be a triplet with density greater, equal to and less than the critical density, superimposed on each other as proposed by N.L. Kachhara. A spherical, close Universe with positive curvature, a flat universe with no curvature and an open Universe with negative curvature can co-exist side by side or even overlapping each other. The Loka, which is our Universe, is a flat Universe acting as an interface between the Universe with negative curvature (called Hell by Jains) and the closed spherical Universe is the sphere on top (called *Devaloka* by Jains) as shown in Fig. 8.1a.

Alternatively, the shape of the Jain Universe looks more like a projection of a four (or more) dimensional object on a our 3 dimensional space (see, e.g. Ouspensky, P.D.). Some of the modern theories suggest that our Universe may have 11 dimensions and it may be difficult to draw it on the 3D euclidean space.

The Jain universe basically goes through a cyclic change called the Jain wheel of time (*kālchakra*). This cycle repeats itself over and over again for ever. One complete cycle is divided in to two parts, *Utsarpini* and *Avsarpini*. Each of these have a period of 10 *Kodā Kodi Sagaropams*, the exact equivalent in years is controversial, but it is

very large, and some estimates indicate that 1 KK *Sagaropams* is equal to 10^{14} years, which is difficult to rationalise because the age of the Universe, determined based on Big Bang theory, is only $14x10^9$ years. Alternatively, this would imply that Jain cosmology goes much beyond the Big Bang, and Big Bang Universe is only the current state within a larger cycle in the eternal Steady State Universe. Each of these *Utsarpini* and *Avsarpini* are further divided in to 6 epochs or eras each, called *Ārā*.The period of 1st *Ārā* is 4 KK *Sagaropams*, 2nd is 3 KK *Sagaropams*, 3rd is 2 KK *Sagaropams*, 4th, 5th and 6th together is 1 KK *Sagaropams*. The 5th and 6th *Ārās* are equal to 21000 years each. The Utsarpini likewise have six *Ārās* with periods in reverse order, beginning with the smallest period of 21000 years.The names of various *Ārās* have been styled after "degree of happiness", which may imply favourable or unfavourable climatic conditions.The *Ārās* are not cycles in the sense that they are not repetative in contrast to climatic, geologic or astronomical cycles which go on repeating over and over again.

The period of the smallest *Ārā* of 21000 years agrees with one of the Milankovitch solar insolation climatic cycles, as discussed below. Modern climatic changes occur cyclically on several time scales. If we consider cycles which affect life on the earth, then there are cycles which can be classified as climatic cycles, geological cycles and astronomical cycles with increasing periods. Considering only the important ones, there is diurnal cycle, monthly lunar cycle and annual solar cycle. The climate of the earth depends on solar irradiance received by the Earth. Milankovitch found that the solar irradiance depends on three cycles, the precession of equinoxes (which changes inclination of the spin axis of the earth) with a period of 21000 years (19 and 23 thousand years respectively when, at aphelion, the northern hemisphere is tilted away from the sun and towards the sun), obliquity of the earth, which again depends on the inclination of earth's axis to the ecliptic (the plane in which earth moves around the sun in its orbit) which changes with 41000 years period and change of eccentricity of the earth's orbit (which changes the distance of earth from the sun) which varies with a period of 100,000 years. All these cycles have been experimentally confirmed by climate markers (isotopic fractionation records) preserved in the deep sea sediments. It is difficult to say if the jain cycles are climatic cycles, because their names are related to

"happiness and unhappiness" and it may just be a coincidence that the two of the Milankovitch cycles agree with the period of 5th and 6th *Ā rā*. The 100,000 year climatic cycle, however, does not match with the period of 4th *Ārā*, which has a large period, again raising doubt about the jain units of time[1]. None the less this can be a subject of further investigation.

An important geological cycle (probably related to volcanic periodicity) is 33 million years. The sun moves in the galaxy like a carousel. Astronomical cycles include motion of sun in and out of the galactic plane which is about 60 million years and rotation of sun around the galaxy which is about 250 million years. The sun itself has an expected life of about 10 billion years, before all the nuclear fuel will burn out, and presently we are about half way through its life cycle. The Universe was formed about 14 billion years ago and we know reasonably well how it evolved since then. However not much is known about what happened before the Big Bang and what will happen in the future. The future of the universe however depends on the model used.

We may summarise the discussion in this chapter by stating that modern cosmology is firmly based on observations and theories and Jain cosmology has many appealing concepts. There is scope of reconciling some aspects of Jain cosmology with modern theories. No doubt there are many points of debate, disagreements and disputebut this itself is a reason enough for further investigations.

9

Theory of Association and Dissociation

Everything in the universe is a result of association and dissociation

The Universe is a consequence of association of some basic constituents *(tattvas)* and dissociation of aggregates so formed; both of these processes are going on ceaselessly since eternity. Processes of association and dissociation is central to Jainism. The association of soul with *karmāṇus* leads the soul to manifest in various *yonis* and dissociation or shedding of *karmānus* leads to *Mokṣa* which is the ultimate goal of all living beings. In the material world, as we know from physics, the association and dissociation occur at various levels. There are two types of physical entities in the universe: matter and radiation. They interact due to certain forces, obeying some laws, and form all the aggregates that we see. Matter can be converted into energy and vice versa. Matter exists in forms which are massless or with mass. Those at elementary particle level, for example, in quark-gluon plasma (the ultimate particles constituting the Universe) and between protons, electron and neutrons, these processes of combination and disintegration are governed by nuclear forces, i.e. strong and weak nuclear interactions. These are dealt under the domain of physics. These continue to form atoms and molecules and they in turn form compounds and minerals. At atomic and molecular levels, i.e. formation of compounds and minerals, the processes occur electrically and these electromagnetic associations and dissociations come under the realm of chemistry. The modern chemistry postulates various types of electric bonds, depending on the nature of the elements takeing their valency into consideration. The combinations of simple carbon bearing molecules (containing hydrogen, nitrogen, oxygen etc.) can lead to large complex molecules. It is believed that these molecules can ultimately lead to formation of biomolecules and simple living cells. These then undergo Darwinian evolution, by interaction with the environment. The modern science has postulated matter formation of living non-living matter, but has not demonstrated that this actually happens.Therefore, so far it remains only a hypothesis. This postulate does not require the existence of soul.

As far as matter is concerned, at the level of large masses, gravitation comes in

to play and formations of planets, galaxies and largest structures including the universe is primarily governed by gravitational force although within each system, electromagnetic and nuclear forces also play a role.

According to Jainism, body has a multilayered structure; the physical body is the gross form and the *karman* body is the subtlest form, as mentioned in chapter 5. The various aggregates, called *varganās,* should be able to form the five types of bodies, *Karman* (causal), *Tejas* (energy), *Āhāraka* (conscious), *Vaikriya* (form) and *Audārika* (physical) bodies. These five bodies are formed by five types of aggregates, known after their names: i.e. *karman vargaṇā, tejas vargaṇā, āhāraka vargaṇā, vaikriya vargaṇā* and *audārika vargaṇā.* Beisdes these five *varganās*, three other important vargan*ā*s are *manovargaṇā* (mind vargana: for formation of thought and mind), *swāchosvās* (breathing *vargaṇā*) and *bhāshā* (speech *varganā*). The five bodies postulated by Jains may be compared with the three bodies *(Dharmakāyā* (conscious body), *Sambhogkāyā* (transcendental body) and *Nirmānkāyā* (physical or experiencing body)) mentioned in Buddhism or the five bodies in Hinduism: *Annamaya* (Gross physical body), getting its energy from food (*Anna*); *Prānmaya* (Breathing body), getting its energy from breathing; *Manomaya*, (mental body) getting its energy from learning; *Vijnānamaya* (intelligence or discriminating body), supported by *darṣan* and *Ānandmaya* (bliss body or consciousness) getting its energy from meditation. All these bodies are mutually interacting and supporting each other. All the three faiths, Jainism, Buddhism and Hinduism agree that the conscious body is the ground, seed or foundation on which the edifice of the physical body stands.

The Jain universe consists of *jiva* and *ajiva*. The *paramaṇu* and soul are the smallest, separate and distinct entities, neither forming from the other, but interacting with each other, none the less, and giving rise to the whole universe by association and dissociation, by formation and breaking of aggregates. It begins with the dimensionless *Paramāṇus* forming clusters which grow sequentially. These clusters and aggregates, as mentioned above, are termed as *vargaṇās*. Although *vargāṇas* could be of many types, Jainism postulates 23 types of main *vargaṇās* as follows:

1. *Aṇu vargaṇā*
2. *Sankhyātaṇu* (numerable) *vargaṇā*
3. *Asankhyātaṇu* (innumerable) *vargaṇā*
4. *Anantanu* (infinite) *vargaṇā*

5. *Âhāra vargaṇā* (for *audârik* (gross), *vaikriyak* (fluid) and *āhārak* (transitory) bodies)
6. *Agrāhya* (non-associable) *vargaṇā*
7. *Tejas vargaṇā* (for Tejas body and electromagnetic particles and waves)
8. *Agrāhya* (non-associable) *vargaṇā*
9. *Bhāshā vargaṇā*
10. *Agrāhya* (non-associable) *vargaṇā*
11. *Mano vargaṇā*
12. *Agrāhya* (non-associable) *vargaṇā*
13. *Karmanā vargaṇā*
14. *Dhruva* (permanent) *vargaṇā*
15. *Santar nirantar* (discontinuous-permanent) *vargaṇā*
16. *Dhruv ṣunya vargaṇā*
17. *Pratyek sharir vargaṇā*, used for making immobile life forms (plants)
18. *Dhruv ṣunya vargaṇā*
19. *Bādar nigodh vargaṇā*
20. *Dhruv ṣunya vargaṇā*
21. *Sukshma nigodh vargaṇā, Audārik, tejas & karman* bodies of *sukshma nigodh jiva*
22. *Dhruv sunya vargaṇā*
23. *Mahāskandh vargaṇā*: all visible matter is made of this *vargaṇā*

It is further mentioned in the scriptures that *vargaṇā*s 1 to 14 are permanent, continuous and massless varganās and have four attributes (like touch, smell, taste and colour); The massless *vargaṇā*s have energetic associations and have specific functions such as in constructing the invisible bodies of organisms and supporting other life functions. 15 to 23 have mass and are dense; 5^{th} to 14^{th} *vargaṇā*s are formed by combination of lower *vargaṇā*s or dissociation of higher *vargaṇā*s. The interconvertibility of 15^{th} to 23^{rd} varganās is difficult. In view of convertibility of mass and energy ($E=Mc^2$), it

does not make much sense in talking about massless but energetic particles. In any case modern physics measures mass of particles in terms of energy (rest mass of proton is 938 MeV). The remaining types of *varganas* deal with particles with mass where the *paramaṇus* are bonded by their electric charge. Some of these varganas are described as *ṣunya vargaṇā*, probably implying dissociation. The last, 23rd type of *vargaṇā*, is supposed to constitute all the matter present in the cosmos.

Thus the Jain theory of combination deals with the interaction of soul with soul, soul with matter, and matter with matter and is wide in scope.

Now we discuss each *vargaṇā* separately. The summary given above, based on scriptures, may not be consistent with the following discussion which appears more logical. As the combination proceeds, aggregates of matter are formed and when they exceed a critical number or mass, qualities of consciousness, mind and speech are acquired by interaction with their respective *vargaṇās* (*āhārak, mano and bhāshā*). Thus the Jain theory of *vargaṇā* is a step wise, sequential, progressive advancement for acquiring various qualities, we see in *ajiva* as well as in *jiva*.

The smallest material entity is *paramāṇu*. It is extremely small, dimensionless, mass-less, can not be further subdivided, occupies one "unit" of space (one *pradesha*) and possesses high energy. Clusters of *Paramāṇus*, containing a very large (innumerable) number of *paramāṇus*, form atoms known as anu *vargaṇās*. Thus according to Jainism, an atom is made of innumerable *paramaṇus*. On comparing with what we understand by modern physics, the formation of anu vargaṇā must be governed by nuclear forces. The second category consists of skandha or composite bodies, which contain two to innumerable aṇus. This may be compared with molecules and compounds, which may have two (as in inorganic molecules i.e. O_2, N_2, CO_2 etc) to innumerable atoms (as in organic molecules of proteins to amino acids, sugars etc).These combinations must be governed by electric bonding (valency, bonds).The third category is composite bodies, made of innumerable atoms. These may be compared to minerals, which are made of innumerable molecules. When infinite atoms unite then large structures (planetary bodies, stars, galaxies etc) are formed, which come under the fourth category, probably controlled by gravity. These four varganās can form the whole universe (minus *jiva*), and this is a progressive theory of association from the smallest *paramāṇu*, to molecules, minerals and structures where the four forces of nature i.e. strong (nuclear), electromagnetic and gravity come into play. But to form jiva, with consciousness, speech, breathing etc, different types of interactions are required. The above four categories are incapable of being attracted, assimilated and transformed by psychic

forces. To provide them with psychic attributes, *āhāraka varganā* (5th *varganā*) is required and this results in *āhāraka* (conscious) body. This interaction requires an infinite number of *aṇus* to provide it a quality defined as "associability" and provides matter with psychic attributes. This conscious varganā also develops capability of *vaikriya* (transformation of shape and size of body) and *swāchosvās* (breathing). The next (6th) category is defined as the first unassociable (*ṣunya vargaṇā*) category. The next, i.e. *tejas vargaṇā* (7th) results in association of energy with matter and leads to *tejas* body, which provides metabolic energy, paving way to the animate world. *Taijas Varganâ* may be responsible for formation of electromagnetic waves or particles. The next category (8th) is another type of *ṣ*unya *vargaṇa*. Further association leads to *bhāshā varganā* (9th) followed again by *ṣunya vargaṇā* (10th). The next association leads to *manovarganā* (11th), required for formation and functioning of mind and its thoughts. This interaction may enable neurons to get organized and function. This is again followed by sunya vargana (12th) and then comes the interaction of soul with subtle matter (*karma vargaṇa*, 13th). Only the aggregates of this *karma vargaṇâ* have the capability of interacting with the soul. The 14th to 22nd *vargaṇās* are described below. These are followed by the last *vargaṇā* called *mahāskandha vargaṇā*, responsible for the large structures, where all forces and interactions in nature may simultaneously come into play. These structures pervade the whole universe.

In this scheme, one of the important points to understand is the role of the four *ṣ*unya *vargaṇās*. They have been variously interpreted by scholars. Some say that they do not always result in new aggregates. We try to understand them in the frame work of known physics. We interpret them as the *vargaṇās* which destroy (annihilate or dissociate) the aggregates. The first non-usable or non-associable varganā (6th) may, from simily with physics, be considered as antimatter, which on interaction with matter annihilates it and turns into radiation. Like wise every alternate *vargaṇā* after 7th, i.e. 8th, 10th and 12th are non-associable, that is they dissociate the psychic aggregates of *Tejas, bhāshā and mano-* associations. By their interaction, capability of metabolic activity, speech and mind is destroyed. Thus energy, consciousness, mind and speech *varganas* may interact with themselves but would not lead to new aggregates; only when they interact with matter *vargaṇās*, they develop associability and result in new types of aggregates. The 15th is termed as discontinuous-permanent *vargaṇā* which may represent wave-particle duality. The 16th, permanent *ṣ*unya varganā may imply that all associations are permanently destroyed as in pure souls. Thus we see that 1 to 6 aggregates are related to matter, 7th to 13th to consciousness and 17th to 22nd to

soul. The last (23rd), embodies everything in the universe.

Some of these interactions may also be interpreted as resulting in *ṣunya* varganā, but the explanation given above of annihilation or dissociation appear more logical. One thing is clear from the above discussion that psychic aggreagtes can only be formed after matter has attained a finite critical size or mass.

Modern physics and chemistry deals with combination of matter with matter from smallest particles to large compounds. Combination of the minutest particles known i.e. quarks and gluons to protons, neutrons and electrons etc and then their combination to form atoms comes under the purview of nuclear physics. Atoms to molecules to compounds (and minerals) is the subject which comes within the purview of chemical combination through elecric bonding although lots of physical process are also involved. Large structures (planets, stars, galaxies etc) are governed by gravitation and within these structures other forces (e.g. magnetism) also play their role. It is a challenging task to reconcile the theories of modern physics and chemistry with the Jain theory of *vargaṇā*, although we note that 7th to 22nd *varganās* deal with certain aspects of consciousness and soul which is not a subject matter dealt with by science.

10

Jainism and Biology

Living organisms are a miracle of nature

Processes of Birth and death
reincarnation

Jain scriptures have given considerable thought to physics, mathematics, cosmology, geography and chemistry, as we have briefly seen in the previous chapters but it is botany, biology and anatomy which is central to their philosophy, mainly because the prime focus of Jainism is the living beings and their salvation. The approaches of Jainism and modern biology are quite different and except for some basic concepts, not much over lap is found between the two. The approach of Jain concepts is to develop procedures for development of consciousness. Therefore they treat physical and psychic aspects together. For this purpose their approach is based on ten physical forces and five psychic forces. However, it may be emphasised that the Jains have excelled in several concepts related to the living, much ahead of the modern biology. For example since at least 2600 years ago and possibly even before (going back to the times of Rishabh), the Jains believe that plants have life and can communicate, a fact discovered by modern science only a few decades ago.

Rigorous definition of life has been elusive. Modern science as well as various philosophies have not found a complete and correct definition of life. Jainism defines life as having six physical attributes: reproduction, growth, metabolism, movement, response to external stimulation and adaptation to environment (which may imply evolution) and some psychic attributes: consciousness, learning, self awareness, discrimination between good and bad etc. However a few (but not all) of the physical attributes can also be found in non-living (organic or inorganic) compounds under suitable conditions. Detailed discussion of the various Jain concepts related to biology and botany is beyond the scope of this book and we confine here only to those aspects which can be integrated

with the theory of *Karma*. The theory of *Karma* was developed to deal with the living and logically explains the inconsistency between individual's present actions (karma) and their expected consequences (deeds and destiny) in this life which some times seem unrelated or even contradictory.

Jains, as discussed previously believe in various layers of bodies (*karmic*, luminous, physical etc; chapter 6) which a living being possesses. *Chakras* related to anatomy have been discussed briefly in chapter 6 and the main emphasis is to activate these energy centres, which is useful in activating *Kundalini* required for emancipation. Therefore much importance is given to *praṇa shakti* (respiratory energy) which is vital in this process.

The relevant aspects of Jain biology are summarized below:

1. Jain scriptures mention three different types of life: *Audārik, Vaikrayik and Āhārak* which exist in different, well defined parts of the universe (called regions of heaven, human (and other earthly) habitation and hell). Thus life of different kinds may exist in many parts of the universe. As discussed in chapter on cosmology, if universe is created in triplets with positive, flat and negative curvatures, the regions of heaven, human habitation and hell will populate these three regions respectively.

2. Jains have classified living beings on earth according to their sensory faculties, single sensed (e.g. plants), two sensed (worms), three sensed (ants), four sensed (butterflies), and five sensed (mammals, humans) *indriyas* (sensory organs : touch, taste, smell, vision, and hearing) which in a way is related to their increasing levels of consciousness. As far as the theory of *Karma* is concerned, plants and all types of animals are treated at par, subject to the same rules and can take rebirth in any forms, depending on their *karmas*.

3. Unlike the Darwin's evolutionary theory, according to which the life on earth, which gradually evolved in steps from mono cellular organisms to humans in the 3.5 billion years of geologic history (Chapter 1), according to Jainism, all species occur someieswhere in the Universe at all times. The two concepts together are consistent with the idea that life is not confined only to the earth but is spread through out the whole universe.

4. Jains believe in a soul in all living beings and therefore in reincarnation (rebirth). Rebirth explains the fate of different beings which apparently may

not be a direct consequence of their actions in the current life but may be cumulative consequence of karmas in the previous and current lives. Transmigration from one body to another is one of the corollaries of this postulate.

Rebirth allows one to expand one's life beyond one life span and continuity in his pursuit of enlightenment, so even after death, there is hope of attaining any goal one chooses. Case histories of rebirth abound, but most of them are subjective, and rigorous, acceptable scientific proofs are not readily available. Logically there is no difficulty in accepting rebirth since if one can be born once, he can be born again and again, when the conditions are appropriate. Laws of physics allow the same process to re-occur under similar conditions.

In Jainism, much thought has been given to the process of birth. Apart from the usual processes of sexual and asexual births through conception (from eggs and from womb), pollination etc, Jainism postulates that some divine beings are born by some uncommon, non-natural, asexual process, as has been the case with Christ, the son of God, who was born to Mary the Virgin, Rama (and his brothers) who were born by Yagna, Karna and some Pandavas who were conceived by Kunti from Sun God and Mahāvira, whose fetus was transferred from the womb of Devananda, wife of a brahmin Rishabdatta to the Queen Trishala. Buddhism also claims the "appearance" of Padma Sambhav from a lotus in a lake in Copper mountains.

Modern biology has made tremendous progress in the past few decades, with techniques of molecular biology, genetic engineering and determination of genome sequence in different species. It has been established that physical and mental conditions or health of a living being depends on genome sequence with which one is born, a concept close to karma concept of Jainism. There is much scope for research in biology keeping in view the various Jain concepts and equally importantly for confirmation of Jain concepts using modern experimental and analytical techniques. If Jain concepts can be rigorously formulated, and if found true, the techniques of modern molecular biology can hopefully clarify many of them , and provide rigorous scientific basis. For example a question arises whether the *Karman sharira* decides the genome or the DNA sequence. Furthermore do the various procedures of *sādhana* (Tapas, mantras and meditation or adherence to the five Mahāvrats, discussed in Chapter 6) can modify the genome sequence in long run? The relation between *parmanu* and *karmānu,* the influence of *karmānu* on genome and whether *karmānus* operate on

molecular level or still finer levels are some questions which can now be looked into as the modern techniques develop further. Cloning will resolve or confirm many Jain concepts about the existence of soul, and how it is embodied and the importance of various *karma* which always remain attached to the soul till it is liberated (chapter 4, 5). Cloning can thus provide a litmus test to the Jain theory of *Karma*. If a large number of clones are made, they are found to be exactly identical with hardly a few exceptions. How can then, soul selects a body when it is born according to its *āyushkarma, nām karma and gotra karma* (Chapter 4). This can be explained in many ways in the light of modern understanding, which would also be consistent with Jain theories of *karma*, but is a subject requiring research and reinterpretation of Jain concepts. Thus existence of soul with its adhering karmas can be verified, albeit indirectly or by inference, if proper questions and experiments can be formulated.

In the past few decades enormous amount of research has been carried out on the process of birth. Sexual and asexual reproduction, test-tube babies, surrogate mothers, cloning, genome and synthetic DNA are some examples which show that complexity of birth has been understood to a great extent. But the biology has not worried much about death except for considering, though wrongly, that the death is the end of life. The oriental religions like Jainism, Buddhism and Hinduism have given much thought to understanding the process of death. Death actually is a prolonged and gradual process and not an instantaneous event as it is made out to be. Death begins with the birth and continues till the rebirth in the next life. The interval between two deaths, what we call life is only an opportunity for attaining enlightenment.

The body of all living species, to the smallest unit, are an aggregate or combination (*skandha*) of many elements and all these aggregates have to dissociate to their "virgin", unaggregate state and are dissolved at the time of death. It is easy to understand the process if we consider the principal constituents of the human body according to Jainism and Buddhism anatomy. The scriptures mention that the body consists of a dynamic network of subtle channels (*nādi*), winds (*prāna*) and essences (*bindu*).There are 72000 subtle channels in the body, of which three are the principal channels (the spine starting from *Mulādhār Chakra* to *Sahasrār Chakra* and one channel on each side of it, i.e. to its right and its left). There are seven chakras (*Mulādhār, Swādhisthān, Manipur, Anāhat, Vishuddhi, Āgnā and Sahasrār*) as described in chapter 6 and knots formed by coiling the two principal side channels, containing impure winds with the central (wisdom) channel, the spine. There are 5 root winds for each element, allowing the body to operate and 5 branch winds for the five senses to

function. The essences, white and red in colour, are contained within the channels or chakras; the white essence in *Sahasrār* and the red in *Anāhat Chakra*. Our physical body is made of 5 *skandhas*, the aggregates that compose the whole mental and physical existence. The experience of form, feeling, perception, intellect, consciousness and ego are due to these aggregates.

According to the Jain scriptures the dissolution progresses, starting from the grossest (universe) to the subtlest (soul) and in the process the five bodies: *audārika* (physical), *vaikriya* (multi-shape), *āhāraka* (conscious), *tejas* (energy) and *karman* (causal) bodies, discussed in Chapter 6, dissolve one by one. The process of dying thus is very complex and interdependent process. It consists of two main phases: outer dissolution when senses and the elements of the body dissolve and inner dissolution of the gross and subtle thought states and emotions. Beyond the physical body is the aura, which extends far in space. The first one to dissolve is the aura and with it begins the dissolution of the perception of the Universe. The Universe does not dissolve in reality but its perception dissolves and, as far as the person is concerned, its dissolution is complete with the dissolution of senses. For example if a dying person hears sound but can not make out words then the hearing consciousness ceases to function. When one sees the outline of an object but not the details then the vision consciousness starts to dissolve. Similarly the senses of smell, taste and touch go away, one by one, but not necessarily in that order. When all these senses are completely gone, then the perception of the universe disappears. According to the Tibetan book of the dead (by Robert Thurman) and the Tibetan book of living and dying (by Sogyal Rinpoche), thereafter starts the dissolution of the five elements making the physical body: earth (bones and muscles, organs of smell and odours), water (blood, liquids of the body, organ of taste), fire (energy, organs of vision, warmth), air (*prāna*, organs of physical sensation, touch etc) and space (cavities of the body, organs of hearing and sound). Summarising from these books, each of these elements of the physical body (earth, water, fire, air and space), sequentially withdraws into the next one by one. First, the earth element (bones, muscles, etc) starts withdrawing in the water element. The dying person looses all strength, can not support himself, and gets a feeling as if he is being crushed under a mountain or sinking underground. Symptoms like cheeks sinking in and black stains appearing on the teeth or ear lobes curving in appear. Mind becomes drowsy and delirious and illusions like shimmering mirage appears. Then the water element starts withdrawing in the fire element. The dying person looses control over body fluids and there is discharge from eyes, nostrils etc. Tongue, mouth and lips feel dry and sticky. The dying person

This mental body, not supported by a physical body, is constantly moving till it finds a suitable womb and enters it according to its *karma* and in this process sequentially unites with the fire, water and earth elements. It should be remembered that this mental body has the memory and affinity of the previous life, is clairvoyant and keeps hovering over its dead body and earthly possessions, friends, relatives, trying to reenter the body and repossess the material assets to which it is attached.It is said that this state (of *bardo*) continues for 21 days with strong impressions of previous life and the rebirth has to wait for suitable parents where the future life will match the past *karmas*. When suitable parents are found, the soul enters the womb of the new mother and new life begins, as it ended with ground luminosity i.e. according to the eternal natural laws.

It is said that at the time of death, the review of the past life occurs and the whole life runs like a film. One can "witness" every event which occurred, good or bad, in all its vivid details.

Thus we see that the process of death, or dissolution of bodily traits (senses, constituents etc) and mental faculties (anger, desire, ignorance, delusions etc) is a long sequential process and is only complete with rebirth. These processes occur not only in humans but in all species. There is more to death than what the medical science believes. The medical or clinical death, when the heart beat, respiration and brain function ceases, is only one stage in the whole process and there is much scope for research in this multi stage process of death. With the sophisticated tools of biology now available, it should be possible to verify and reinterpret the scriptures in modern terms and understand their significance.

Thus we see that, although the Jain biology appears to be much wider in scope compared to the modern biology, many of its aspects may appear irrelevant and even inconsistent with the modern concepts. It is desirable to unite the two and have an integrated approach to understand these processes which are of vital importance to an individual.

11

Jainism and Peace

Peace to all living beings is the credo of Jainism and therefore this book would remain incomplete if we do not mention the Jain concept of peace. According to Jainism, peace is a fundamental quality of the soul, essential for attaining *infinite Ānanda*, as discussed in chapter 2. Eternal peace is the primary state as well as the ultimate goal of soul. Peace is an internal aspect of mind as well as external aspect of the individual, family, society, nation, the world and indeed the whole universe; The internal peace of mind and external peace in the world are two different things; in the absolute sense, they are independent of each other but in practice they are inter-related as well. One can attain internal peace even when the external conditions are adverse and persons may appear externally peaceful even though internal peace eludes them. The Jain concept of peace is different from most other philosophies.

The basic Jain approach to Peace is the welfare (*mangal*) of all living beings, from smallest insects to the most evolved mammals. There are many aspects of peace in Jainism:

1. Peace (*Shanti*) is an eternal quality of the soul. One can attain eternal peace by conquering one self, making one free of all the vices (anger, jealousy, competition, attachment, hatred etc) which are then automatically eliminated. When one is peaceful with him self then the family becomes peaceful, then the society, then the nation, then the world and then the whole universe.
2. Welfare of self depends on the welfare of others; hence the principle of non-violence. Welfare of all living creatures constitute the main thrust of Jain prayers.
3. Peace entails respecting views of others even if they are contradictory; hence the principle of *Anekāntvād*, discussed in Chapter 3.
4. Peace can not be attained without sacrifice on part of the self. Hence the principles of *Tapa*, living frugally, *aparigrah* and *āsteya*.

Peace in some other thoughts, particularly in the western approach, implies safe conditions for one self without much concern about the safety of others. In contrast, Jainism believes that safe conditions for one self are only ensured when it is safe for

everyone else in the world; hence there is more emphasis on the safety of others rather than oneself.

When one conquers one's own self, one attains internal peace but for external peace conquering the world is not essential. The Buddhism and Jainism have the same approach to peace: one need not be a super power with powerful weapons at its disposal to rule the earth. The real super power status is attained, not at the point of gun, but when others willingly share and follow your thought and philosophy. A case in point is Buddhism which started in India but at one stage more than half the world, including China and Tibet to the north, Japan, Malaysia, and Indonesia to the east, Afghanistan to the west and Srilanka to the south, besides India followed Buddhism in thought as well as in action without coercion. In oriental thought this is the real mark of a superpower.

Non-violence and forgiveness are the prime requirements for peace. Non violence should be practiced to the extent that you do not hurt any creatures in thought, words and deed and you seek forgiveness in case some one is hurt, knowingly or unknowingly. Most people in the world do not like violence and in this respect they follow Jainism to some extent. Jainism does not permit any form of violence in thought, action or consent and even support of violence for any reason whatsoever even at the cost of the physical safety of oneself or in self defence. Non violence must start at the lowest level of living species and should not be confined only to humans. Vegetarianism is thus basic to Jainism. There is detailed procedure for seeking forgiveness. First one should purify the body by fasting and observing other *Tapas*, then purify the mind by doing *pratikraman* and then ask for universal forgiveness as discussed in chapter 6. It can be done on daily or yearly basis. The Jains have earmarked a day every year, called the universal day of forgiveness, for seeking forgiveness. This certainly brings peace and harmony in the family and society. It is hoped that the Jain practices will lead to a peaceful world and bring welfare to one and all.

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Appendix: 1

Some inconsistencies in Jain geography and cosmology with modern science

Science has made tremendous progress in observational techniques and theoretical modeling during the last four hundred years, since Galileo first looked at celestial bodies with his telescope and Newton enunciated the laws of motion. As mentioned before, Jainism considers Lokvad as an essential part of its darśan and asserts that the truth is intervowen with the universe. We can not therefore ignore the scientific studies. It may be noted here that science and Jainism, both are quests for truth and at least in the physical aspects, they both should be consistent. This has to be considered within the framework of their limitations. Science can be incomplete, always amenable to modification, but can not be wrong as it is based on observations. Of course it carries with it the limitations of *indriyas* and intellect used for observations and comprehension. Jainism, on the other hand, has no such limitations since the *jnān* given by Tirthankaras is *indriyateet*. Unfortunately there is no record of direct and verbatim rendition of words spoken by the Enlightened. They all have been compiled much later and have been subjected to interpretation. They are thus subject to limitations posed by the competence of the compilers.

The glaring inconsistent aspects between Jain scriptures and modern science mainly relate to

1. Geography: Remote sensing by space techniques have given us very clear picture of geography of the earth and planets
2. Cosmology: Here "cosmology" is taken as to include planetary sciences too.

Under these two general headings, we list below some of the concepts mentioned in the scriptures which appear to be "erroneous":

1. Flat earth concept:

Jambu Dwip Pannati describes the flat earth theory, with two suns and two moons. This theory appears to be a concept prevalent at that time in the west as well as in the orient and does not seem to be an exclusive Jain concept. Some Jain scholars have tried to fit in existence of two suns and two moons in the following manner: There is a theory of formation of planets which postulates that in the beginning, before our

solar system came in to existence, two stars (one of them being our sun) had a close encounter and pulled out material from each other in a cigar shaped mass, which subsequently coalesced in to planets. The other star then moved far away on its course and it is not possible to identify it now. This theory is no longer in vogue and has been replaced by the theory of solar nebula formed from a cold, rotating, dense molecular cloud which gave rise to Sun and planets as it contracted. The two moon theory is explained on the basis that the Earth at times, temporarily captures another satellite as the small bodies of the solar system (asteroids) pass by. This is quite plausible and has happenedoccasionally, though at present the earth has only one big satellite, our Moon and millions of small bodies (dust particles) going around. These small bodies can hardly be called natural satellites. The period of day and night varying between about 18 and 6 hours, mentioned in the *Surya* and *Chandra Paṇṇati* do not fully give the range of their periods from polar to equatorial regions of the earth (which ranges up to 6 months), and is probably a result of limitation of observation from the limited region of Jambudwipa, that is presumed to be India.

1. Distance and motion of Sun, Moon and other planets.The distances of the Sun and Moon from the earth are mentioned about equal (800 yojans). In fact the scriptures mention that sun is slightly closer to the earth than moon (may be because the sun is brighter?). This is totally erroneous. The sun is 400 times bigger and 400 times farther from the earth as compared to the moon.

2. Structure of the universe:

   It is mentioned that the universe has a peculiar shape (Fig. 8.1b). Such a structure is absolutely unstable. This may be taken as projection of a three (or four?) dimensional structure on two dimensional sheet of paper. Cosmological modelsmentioned in the scriptures depict a multi- angular shaped Loka within infinite Aloka. Physics demands that (1) natural shapes are not angular and stable; spheroids, ellipsoids and disks are natural stable shapes (2) there should be an interface between any two bodies or two media with different properties i.e. between Loka and Aloka. One can not sharply end where the other begins as has been seen in many celestial systems.

3. Shape of *Jambu Dwipa*: Remote sensing and photography from space has given us a definite idea about the shape of continents on the earth. According to scriptures, the continents are circular, each surrounded by a salty ocean (*Lawan samudra*), each outer structure being twice the size of the previous one.This is certainly not correct. This reminds us of quantum mechanical model of the atomic

orbits where orbits go in an integral function of n (n=1,2,3…).

Like wise there are other innumerable examples which are not consistent with modern science. The list is long and would need a separate treatise to discuss all of them but we have chosen only a few examples mentioned above to illustrate that many concepts need to be critically examined and revised. Many of these problems have been pointed out by several scholars, specially B.R.Singhvi in his book "*Jain Dharma ki asangat batein* (1943)".

We may reemphasise that these concepts have been compiled by later scholars, much after Mahāvir, and have been influenced by other prevalent ideas and are not a direct rendition of the Tirthankar's words.

One may wonder that if so many errors have crept in over the course of time, then what is the reliability index of scriptures. In this context, we want to mention that there indeed exist many valuable concepts in the scriptures and they represent a deep understanding of the universe, not withstanding the points made above. Without being influenced by the high precision of calculations and numbers given in the scriptures, each calculations must be critically examined in view of the large mass of the scientific knowledge now available before they are accepted as the words of the Enlightened. Some concepts may go beyond the modern scientific thought and their study may throw new light.

Acknowledgement

The material presented in this book has come from many sources, too numerous to acknowledge here. Some of these have been mentioned in the list of references. My attempt is only limited to synthesis of science and Jainism to the extent possible, in the way I understood them. At places it may be speculative, not based on rigorous foundation. Many aspects are subject to reinterpretation and further experimentation as better understanding develops.

It has been my good fortune to have come in contact with Acharya Shri Vijay Nandi Ghosh suri ji Maharaj sahib who initiated me into this study and edited this manuscript. I am grateful to Dr. Jitendra B. Shah and Dr. Sudhir Shah for encouraging discussions in the Jainism and Science forum at the L.D. Institute of Indology, Ahmedabad which clarified many ideas. Specifically I am much obliged to Dr N. L. Kachhara for critically reviewing the manuscript and for pointing out several inconsistencies and departures from the well established Jain concepts and to Dr M.R.Gelra, Dr. Nirmal Baid and Prof. Rajmal Jain for useful discussions

Jainism, as discussed in this book, propounds that one is alone in this universe and there is no one who can help in his goal including the "God" or the Enlightened ones and one has to charter his own path. Then is there any point in praying to the Enlightened Kevalis? The answer clearly is "Yes", because they can surely help in one way, that is, by showing us the path. We therefore end this book by bowing to Arihants, because they have shown the path to Mokṣa and removing all our doubts, to Siddhas, because they have shown the path of right perception (darśan) by their own example, the Ācharyas, for they have shown the path of right charitra by practicing it, the Upadhyayas for imparting us the right knowledge, to all sadhus in the universe who set example and guide us along the right path. Thus by emulating them, I can also acquire samyag darśan, samyag charitra and samyag jnān. Without them, how could I have known the right path of Mokṣa?

Namokar Mantra

I bow to the Enlightened souls (Arihants and Siddhas) Who realized true knowledge of kevaljnan and showed the path to attain it,
I bow to the Jain sadhus and sadhvis (Acharyas and Upadhyayas),
Who carried the flame of Jainism from the Enlightened ones to me, without which I would have lived and died in ignorance"
I bow to the thinkers, philosophers and scientists,
Who by formulation and experimentation revealed the secrets of nature
I bow to one and all in this universe
who sustain me so that I understand and pursue the true path of Enlightenment.

About the Book

Observation of nature reveals that it has been following a well defined path of evolving consciousness to ever increasing higher levels since eternity. Some of the principles nature employs in this pursuit are the same as enunciated by Jainism. The main aim of Jainism is also to develop consciousness to higher levels and it specifies certain procedures for achieving this goal. These procedures or the path for achieving enlightenment is universal in the sense that it can be adopted by any one seeking enlightenment. The book describes some of these lessons we can learn by studying nature using scientific methods and compares them with the Jain scriptures related to physics, cosmology, chemistry and biology.

About the author

Dr. Narendra Bhandari is a planetary scientist. He obtained his Ph.D. in physics, while carrying out research at the Tata institute of Fundamental Research, Mumbai. .He worked at the Universty of California,San Diego, USA. and as Senior Professor at Physical Research Laboratory, Ahmedabad. His research includes study of cosmic ray interractions with earth, Moon and meteorites.His main scientific contributions are related to application of natural and artificial radioactivity in understanding terrestrial reservoirs like atmosphere and glaciers as well as large impacts on the earth. He worked on moon samples brought by American Apollo missions and USSR Luna missions and on India's first mission to Moon, where he was responsible for defining the scientific objectives and instruments on Chandrayaan-1.For his outsatnding contributions he was awarded Certificate of Special Recognition by NASA,USA, National Mineral award of Government of India and Vikram Sarabhai award for Planetary and Space Sciences.He is a Fellow of the Indian National Science Academy, Indian Academy of Sciences,National Academy of Sciences and Gujarat Science Academy.He has published and edited many books.Notable amongst them is The mysterious Moon and India's Chandrayaan mission which has been published in English, Gujarati and Hindi.

He is much interested in Jain and Buddhist philosophy and he has published several papers.The present book gives a new insight in to Jain path of enlightenemnt.