JAINISM AND MODERN SCIENCE—A COMAPARATIVE STUDY

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Introduction

Religion is the science of living, and science and technology are essential for sustaining life on earth Thus religion and science are two sides of the same coin. The Sanskrit word for religion is DHARMA which literally means attributes. Thus religion deals with the attributes of human life—of soul and matter. Religion teaches us the way to lead a healthy, meaningful and fulfilling life. It tells us how to deal with our fellow man and with other living beings. Religion is supposed to bring out the best in human beings.

Science is the systematic and accurate knowledge of things and events which occur in nature. It is the study of matter and energy, plant and animal life, the utilization of natural resources without upsetting the delicate balance in nature, making human life better on earth without hurting the environment—the vegetable and animal kingdoms. Science and Technology advance continually and thus life on earth keeps on changing; mostly for the better. Religion, being the science of living, is also supposed to change with time. In the present article, a few features of Jainism are compared with modern science in light of the above ideas.

The three jewels of Jainism and the Scientific process

The scientific process consists of the following steps :

1. Making observations with an open mind without any bias.
2. Seeking a rational explanation of the observations and building a consistent theory.
3. Performing further experiments to test and extrapolate the theory.

For centuries, science has advanced by way of the scientific process and the state of scientific knowledge is still progressing. A theory is upheld as long as it provides a rational explanation of experimental observation and fits the current structure of scientific knowledge. If any theory proves to be inadequate due to some changes in the state of scientific knowledge or in view of further experimentation, it is discarded and replaced by another theory. There is no room for dogma or preconceived notions in science.

The scientific process is in complete agreement with the three jewels of Jainism (RATNATRAYA). These are the proper perspective (SAMYAK DARŚANA), the proper knowledge (SAMYAK JNĀNA) and the proper life-style (SAMYAK CĀRITRA).[1] The proper perspective involves observing and studying nature-living and non-living, with a view point without any bias. However, this does not preclude the study of religion, Philosophy and science. After a careful observation and thought comes the proper knowledge.[2]

This does not necessarily imply knowing what is written in the holy books or accepting what is preached by a learned person. The third jewel in the life of a Jain is adopting the proper life-style. This involves living in harmony with the fellow beings and with nature. It should be emphasized that the proper way of living does not end with such religious activities as worshiping, praying, chanting, listening to sermons, studying religious books, etc. On the other hand, indulging in these religious activities is undesirable if it is done with an intent of show, pride, greed of material comforts in this life or desires of comforts in after-life. The proper way of living involves being at peace with oneself and with one's environment. In fact, all religious activities are just as essential for learning and adopting the proper life-style as schooling is for career development.

It is obvious that the proper life-style entails minimizing violence of one's own feelings and violence towards other living beings. Thus non-violence is said to be the supreme religion. Further, telling a lie, stealing, wasting natural resources, etc., entail violence of self and of other beings. Therefore, practice of non-violence requires being truthful, non-stealing and avoiding the acquisition of unnecessary materials.

The Theory of Karma and the Scientific view of natural Phenomena

According to modern science, all natural phenomena involve interactions between matter and energy. Water from rivers and oceans is evaporated by the rays of the sun. The water vaporises, clouds are formed and it rains. Thus rain is the result of the interactions between solar energy, water, atmospheric particles, wind etc. Such interactions take place because of the intrinsic properties of matter and energy. Charcoal burns because atoms of carbon have the capability of combining with atoms of oxygen. There is repulsion between similar electrical charges and attraction between dissimilar electrical charges. Therefore, a proton attracts an electron. The electronic circuit in a radio receiver detects the radiowaves, amplifies and rectifies them, and, converts electromagnetic energy into sound energy. On the microscopic scale, matter (atoms, electrons, etc.) and energy (electromagnetic waves) possess certain attributes. Consequently, on the gross scale, the components of the radio receiver and radiowaves exhibit some specific properties which are responsible for the working of a radio set. These are examples of interactions between matter and energy. The Karma theory deals with the interactions between soul and ultramicroscopic particles of matter.

The theory of Karma states that ultrafine material particles (Karma) are associated with the souls of all living beings. Such souls are impure due to the association of Karma particles. Further, the activities of 'life' involve the interactions between impure soul and Karma particles. These interactions include the following :

(a) The Karma particles of various types are attracted by the (impure) soul and the soul sets more Karma particles in its possession. This is known as influx and binding (Asrava and Bandha) of Karma.

(b) The soul voluntarily or involuntarily sheds certain Karma particles. This is known as sheddins (Nirjana) of Karma.

(c) The Karma particles in the possession of a soul of one kind or intensity can be transformed by the soul into Karma particles of another kind or intensity. We shall call this as the transformation of Karma particles.[3]

In addition to Karma particles, there is pseudo-Karma (Nokarma)[4] matter associated with impure souls. The pseudo:Karma include the body, food, medicine apparel, family and other environments. The impure soul has the sensation of pleasure or pain due to the association or Karma and pseudo-Karma. The feelings and emotions of various kinds initiate and guide the interactions between the soul and the Karma particles mentioned above. However, soul is the master of self and the master of Karma, especially in view of the kind of interaction of type (c).

For example, consider 3 students, Sheila, Ram and Padma, who have to take an examination. Suppose all three have the same type of Karma particles associated with their souls. However, Padma studies and prepares well for the examination, takes it with composure and ends up with a good grade. Thus Padma succeeds in transforming the unfavorable Karma particles in her possession. Ram and Sheila fail the examination. Ram sets upset and angry. He blames his Karma and pseudo-Karma (teacher, books, the system, weather, etc.) for his failure. He feels miserable and accumulates more undesirable Karma particles. Sheila takes her failure in stride and makes a determination to study regularly in the future. Obviously, she accumulates particles which are of different kind from those obtained by Ram.

It should be remarked that it is only the impure souls which experience pleasure and pain throush their bodies. Further, each individual soul is independent. The pseudo-Karmas such as a teacher, a visit to the temple, going to a movie or a health spa, may or may not give rise to the feelings and emotions of one kind or another. Thus the same pseudo-Karma may result in the influx of Karmas of different types and intensities in different individuals. This can be compared to a chemical reaction which proceeds differently and, in certain cases, results in

different products, depending on the experimental conditions. In any given situation, characterized by the presence of a set of Karma and pseudo-Karma in one's possession, any individual may have (or may lack) the willpower to mould one's feelings and emotions. Consequently, the person can control, to a lesser or a greater extent, the experience of the Karma in his/her possession and he/she can also influence the influx of new Karma particles.[5] This is the phenomenon of mind over matter.

The realization of the fact that soul is different from the matetial particles (Karma and pseudo-Karma) and that a pure soul is not influenced by material particles is known as the science of differentiation (Bhedavijñāna). This leads to penance (Tapa) which is the absence of feelings and emotions-absence of all desires. This causes sheddings of Karma and cuts of the influx of new Karma particles. Eventually, the soul sheds off all Karma particles and attains salvation (Nirvāṇa). Accordings to Jainism, each individual pure soul is God. It has the attribures of infinite perception (Anant Darśana), infinite knowledge (Ananta Jñana) and infinite bliss (Ananta Sukha). Obviously, having the desire to attain salvation or the desire to accumulate 'good' Karma is improper. The right way is just to inculcate human qualities-to live every moment of life being guided by the three jewels of Jainism. However, this is a difficult path and one can only try one's best.

The Doctrine of Seven Aspects, Relativity and Quantum Mechanics

The Jain doctrine of seven aspects (Syāduāda or Anekānta) is unique in Indian Philosophy. It states that the result of an observation depends on the viewpoint of the observer. There are seven aspects which are useful in the observation and interpretation of the entities and events that occur in the universe :

1. The positive aspect (Syādasti).
2. The negative aspect (Syātnāsti).
3. The confluence of positive and negative aspects (Syādastināsti).
4. The inexpressible aspect (Syādavaktauya).
5. The positive inexpressible aspect (Syādasti Avaktavya).
6. The negative inexpressible aspect (Syānnāsti Avaktavya).
7. The confluence of positive and negative inexpressible aspect (Syādastināsti Avaktavya).

It is rather difficult to understand the full implications of the doctrine of the seven aspects. On the surface, the positive, negative and inexpressible aspects, and, their confluence appear to be inconsistent, but, these different aspects are quite compatible with each other. For example consider the following :

(a) Is a tea kettle indestructible ?

According to the law of conservation of matter and energy, the tea kettle is indestructible. This is, say, the positive aspect. However, the tea kettle is

subject to a variety of transformations. It can be broken into pieces and can be turned into some other object. Thus from this viewpoint, it is not indestructible. This is the negative aspect. A compromise of positive and negative aspects can be easily made in this case.

(b) Is a magnetic field associated with an electrically charged sphere placed in a laboratory ?[6]

According to modern science, there is no magnetic field associated with a charge at rest. However, there is a magnetic field associated with a charge in motion. Thus if scientist in the laboratory performs an experiment to detect the magnetic field due to the charged sphere, the result will be negative. However, if an astronaut on a spacecraft performs the same experiment, he will detect a magnetic field due to the charged sphere because he is in relative motion with respect to the charged sphere.

(c) If a coin is tossed, will it come up heads or tails ?

Obviously, it is impossible to predict the outcome of the toss. This is the inexpressible aspect. Now if the coin is tossed 20 times, it is reasonable to expect that it will come up heads 10 times. However, in any given set of 20 tosses, there is a certain finite probability of its coming up no heads at all, there is a certain finite probability of it coming up heads only once, there is a certain finite probability of its coming up heads twice, and so on and so forth. Obviously, the answer to the question depends on the point of view adopted in answering it.

(d) Consider a ball tied to the end of a string being whirled round and round at a constant speed. It is fairly easy to determine the position of the ball at any instant of time. Now according to modern science, a hydrogen atom consists of an electron revolving around a proton. In this instance, it is not possible to predict the position of the electron precisely. This is the inexpressible aspect. Now if we determine the positions of the electrons of a large number of hydrogen atoms at a given time (or if we determine the positions of the electron of a single hydrogen atom at different instants of time), it is found that there is a definite probability of finding the electrons (electron) at a distance of about 0.0000000053 cm. from the protons (proton). Note the similarity between the present experiment and the experiment of tossing a coin described in the previous example.

There is a rich variety of experiments in modern science which illustrate the doctrine of seven aspects.

According to Einstein's theory of relativity, the result of an observation depends on the relative motion of the frames of reference in which the body being observed and the observer are situated. Thus, if an astronaut in a speeding spaceship, observes the length of rod, the time interval between two events and the magnetic field due to a charged sphere, all placed in a laboratory, his observations

will differ from those of a scientist in the laboratory. Some consequences of the theory of relativity, which have been verified experimentally, are :

1. The mass of a particle increases with its velocity.
2. Energy = (mass) × (velocity of light).^{2}

This is the famous mass-energy equivalence equation which indicates that mass can be converted into energy and the energy can be converted into mass. A certain amount of mass is totally annihilated and converted into energy in atomic reactors. In the Phenomenon of pair producton, energy is converted into mass, i.e., a pair of electron and positron (positively charged electron) is created out of energy.

According to modern science, in certain experiments, light waves (electromagnetic waves) exhibit the properties of wave motion and in certain other experiments, they behave like particles known as quanta. Quantum mechanics is the branch of science which deals with the motion of quanta. A fundamental postulate of quantum mechanics (which is also known as wave mechanics) is Heisenberg's uncertainty principle (or the principle of indeterminacy). It states that it is impossible to simultaneously determine the precise position and the precise momentum (m × v) of a particle. Similarly, it is not possible to simultaneously determine the precise energy of a particle at a given instant of time. Much of modern scientific research is based on the principle of indetermincy and on quantum mechanics. Further, there is the branch of science called the relativistic quantum mechanics in which aspects of the theory of relativity are incopporated in quantum mechanies. Researches in quantum mechanics and relativistic quantum mechanics have led to a great deal of scientific progress. At present, it is not possible to establish a one to one correspondence between the doctrine of seven aspects, and, the theories of relativity, quantum mechanics and relativistic quantum mechanics. However, it is evident that the principle of uncertainty is somewhat similar to the inex:pressibility aspect, and, the theories of relativity and quantum mechanics are parallel to the Jain doctrine of seven aspects.

To a scientist, the theories of relativity and quantum mechanics provide powerful tools for scientific research and progress. To a human being, the doctrine of seven aspects, not only provides a means of achieving the proper perspective and the proper knowledge, but it also furnishes an effective means of living at peace with the self and the surroundings. The proper perspective, the proper knowledge and the proper action can result only if we understand the various viewpoints. Peace and harmony can come only if we try to understand others position. Thus the doctrine of seven aspects is the basis for acquiring the knowledge of the universe and it is also fundamental for adopting the proper life-style. It should be emphasized that understanding others viewpoint leads to the absence of anger (KRODHA), pride (MĀNA), deceit (MĀYĀ) and greed (LOBHA). This results in the shedding of KARMA particles and the prevention of the influx (SAMVARA) of new KARMA particles.

Matter and Energy

According to Jainism, matter (Pudgala) has the following four attributes :

Touch (Sparśa), taste (Rasa), smell (Gandha) and color (Varṇa). Touch is of two kinds : Smooth (Snigdha) and rough (Rookṣa). The Sanskrit words Sparśa, Snigdha and Rookṣa have the common meanings touch, smooth and rough, respectively. However, in Sarvārthasiddhi, Ācārya Pūjyapāda has written

Snigdharookṣatvaguṇanimittāvidyut.

This literally means that lishtning is the result of the Snigdha and Rookṣa attributes. On this basis, Prof. G. R. Jain has identified the Snigdha and Rookṣa kinds of Sparśa with the positive and negative kinds of elecrical charges. Thus Sparśa refers to electrical charge. Further, color (Varṇa) can be related to the characteristic radiation emitted and absorbed by the nuclei, atoms and molecules of the various kind. Possibly, the words Rasa and Gandha also do not have their common literal meanings in this context. This may also apply to the words Asti, Nāsti and Astināsti of the doctrine of seven aspects. Inicidentally, the names given by the modern scientists to the attributes of some elementary particles are charm, flavor and color. In this context, these words also have meanings at variance with their common meanings.

One remarkable aspect of the Jain concept of matter (Pudgala) is that light, heat, sound, images, etc., have been enumerated as the transformations of matter (Pudgala).[7] The equivalence of mass and energy which is a consequence of the theory of relativity is in complete agreement with this concept of Jain theory of matter. Further, the Jainas say that the binding of the various particles occurs due to the Snigdha and Rukṣa attributes. This is also in agreement with modern Science.

Conclusion

It is evident from the above discussion that the broad premises of Jainism and modern scienee agree to a great extent. Further, there is a lot of room for scientific study as far as the Jain concepts of universe, matter and souls are concerned. An objective study of the Jain principles may bring out some detailed agreement between Jain concepts and modern science.

References

1. The Sanskrit word SAMYAK means rational and proper.
2. PRAMĀNANAYAIRAHIGAMAH-TATTVĀRTHASUTRA by UMA-SWAMI, Chapter 1, SUTRA 6. It means that the knowledge is attained by means of experimentation (experimental proof) and logical thinking.
3. This includes (a) change of Karma of one subclass to Karma of another subclass (Saṅkramaṇa and Udvelana). (b) decrease in intensity and duration (Apakarṣaṇa) and (c) increase in intensity and duration (Utkar-

ṣaṇa) of Karma Tattvārthasūtra (Hindi) by Pt. Phool Chandra ji Siddhantashastri, published by Varni Granthmala, Varanasi, First edition pages 395, 398-404.
Also, see Gommatsāra Karmakāṇḍa, Gatha 409.

4. Ibid, Gatha 3. Nokarma is also known as Nimitta
5. Tattuārthasūtra by Umaswami, Chapter 6, Sutra 6.
The type of incoming Karma particles depends on the following :
(a) intensity of feelings, (b) intentional of unintentional nature of actions, (c) type of pseudo-Karma and (d) capability of the individual.
6. Cosmology : Old and New by Prof. G. R. Jain. published by Bhartiya Jñāna Pīṭha, 2nd edition, pp. viii-ix.

लेखसार

जैन धर्म और आधुनिक विज्ञान : एक तुलनात्मक अध्ययन

डा० दुलीचन्द्र जैन, यार्क कालेज, न्यूयार्क, अमरीका

वस्तुतः विज्ञान और धर्म एक ही सिक्के के दो पहलू हैं। धर्म हमें जीवन में जीने की कला सिखाता है। विज्ञान जगत के सभी द्रव्यों और घटनाओं की व्याख्या करने और हमारे जीवन को भौतिकतः सुखी बनाने का प्रयास कर हमारे धार्मिक जीवन को उन्नत बनाने में योगदान करता है। विज्ञान निरीक्षण, परीक्षण एवं सिद्धान्तीकरण की प्रक्रिया द्वारा पूर्वाग्रह रहित पद्धति को अपनाता है एवं हमारे ज्ञान तथा क्रियाओं को प्रभावित करता है। जैन धर्म के अनुसार भी धार्मिक जीवन के लिए रत्नत्रय का मार्ग बताया है। दर्शन निरीक्षण का प्रतीक है, ज्ञान परीक्षण का प्रतीक है और चरित्र इनके प्रयोग और व्यापकीकरण की संभावना का प्रतीक है।

जैन धर्म का कर्मवाद भी कर्मकण और आत्मा के संबंधों के आधार पर जीवन को मुक्ति दिलाने का मार्ग प्रशस्त करता है। कर्मों के साथ नोकर्म भी रहते हैं। इनकी प्रकृति का प्रभाव हमारे जीवन पर पड़ता है। इनकी भिन्नता के कारण ही एक ही कक्षा में पढ़ने वाले तीन विद्यार्थियों का परीक्षाफल भिन्न-भिन्न होता है। वस्तुतः संसारी जीव ही दुःख एवं सुख का अनुभव करता है, परन्तु उसमें ईश्वर बनने की क्षमता है। इन कर्मों का विलगन एवं नये कर्मों का अनागमन ही हमारे जीवन को शुद्ध बना सकता है। इस विषय पर अब वैज्ञानिक भी ध्यान देने लगे हैं।

जैन धर्म का स्याद्वाद आज के सापेक्षतावाद से कहीं आगे है। वह तो गूढ क्वान्टम सिद्धान्त का ही एक ईसापूर्व युगीन रूप है। इसके अनुसार, वस्तु या घटना का विवेचन निर्देश बिन्दु पर निर्भर करता है। इसीलिये अनेक विवरण सापेक्षताधारित क्वान्टम यांत्रिकी के आधार पर ही दिये जा सकते हैं। आज के इन सिद्धान्तों को स्याद्वाद का समान्तर तो माना ही जा सकता है।

जैन धर्म के अनुसार, पदार्थ और ऊर्जा एक ही द्रव्य के रूप हैं। क्वान्टमवाद ने यही तर्क तथा प्रयोगों से सिद्ध किया है। इसी प्रकार, दो कणों के बीच स्थायी संयोग उनके विरोधी विद्युत् गुणों के कारण होता है, यह मान्यता भी पूर्णतः विज्ञान समर्थित है।

इस प्रकार जैनधर्म के सिद्धान्त और आधुनिक विज्ञान पर्याप्त अंशों में एक-दूसरे से सहमत हैं। फिर भी, जैन धारणाओं को वैज्ञानिक रूप से अध्ययन करने की पर्याप्त आवश्यकता है।