# Some Strange Notions in Jaina Cosmology

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## 1. Notion about the shape of the earth

Man everywhere had been continuously striving for a formulation of concepts which will permit description of the real world around in mathematical terms. Consequently any such scientific persuits rendered the development of some wonderous types of cosmological and cosmographical notions among all ancient nations. Ancient Greek intellectuals[1] had developed certain peculiar notions. The earth was supposed to be cake-shaped by Anaximander (611-546 B. C.) and to be surrounded by a sphere of air outside which there was a sphere of fire. Pythagoreans supposed the universe to consist of separate concentric spheres of crystal which respectively carried along by their rotation Moon, Sun, each of five planets and the whole body of fixed stars ; and these spheres in their rapid motion emitted a music to be perceived only by those of the most exalted faculties. Anaxagoras (C. 500-428 BC) of Klazomenae believed that the Sun was a mass of blazing metal as big as Greece and the other heavenly bodies are alike masses of rock. It is also said that Anaximander (611-546 B. C.) of Miletus had suggested about 550 B. C. that men lived on the surface of a cylinder that was curved north and south[2]. Egyptians[3] believed that the earth was rectangular like their country.

The cosmic view-points most popular among the Japanese intellectuals at the beginning of Tokugawa regime (Sixteenth Century A. D.) were the Confucian Ten'en-Chih-o-ron i.e. the theory that heaven is round and the earth is square. This theory was upheld by Japanese people even upto the middle of seventeenth century A. D.[4] According to the Chinese view-points[5], the earth is square and the heaven is like a hen's egg and the earth in it is like the yoke.

Similar notions were also prevalent among Vedic people. According to Rigveda (X. 89) the earth was regarded circular like a wheel and also according to some other verses of Rigveda (III. 55) m the earth has the shape of a bowl and also the heaven has an alike one, the two great bowls being face to face with each other.[6] Likewise Jainas had also a different cosmological scheme and believed that the earth was made

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1. Taylor, F. (1940). A Short History of Science, pp. 34-35.
2. Asimov, I. (1971). The Universe, p. 5.
3. Vaucouleurs, G. D. (1957). Discovery of the Universe. 2nd ed. p. 18.
4. Hirose, Hideo (1964). The European Influence upon Japanese Astronomy. Reprint from 'Acceptance of Western Cultures in Japan from the Sixteenth to Mid-Nineteenth century" pp. 61-80.
5. Jaggi, O. P. (1969). Dawn of Indian Sciences. Vol. 2. p. 47.
6. *Ibid.* p. 43.

up of a series of flat concentric ocean rings. The central island of the earth was called Jambūdvīpa (an isle of Jambū tree) and the mount Meru was placed at its centre[1]. Jainas might have perceived that maṇḍalas[2] (diurnal circles) of the Sun are almost concentric. Consequently they perceived the mount Meru placed at the common centre of these circles such that the Sun and the Moon etc. moved in their diurnal circles round the mount Meru[3]. The increasing diameters of maṇḍalas (diurnal circles projected over the surface of the earth) of the Sun on its southern journey and vice versa were measured along the surface of the earth ; 65 solar maṇḍalas are stretched over 180 Yojanas[4] in Jambūdvīpa and 119 solar maṇḍalas over 330 Yojanas in salt ocean. Probably because of the strong impact of circularity of solar maṇḍalas, Jainas might have been led to conceive that they lived on a circular land mass surrounded by salt ocean. Consequently they might have further envisaged as if the earth was made up of circular land masses alternatively surrounded by ocean rings. This invariably implies the concept of flat earth.

It is worthy of note that Aristotle (384-322 B. C.) put forward the idea that the earth was not flat[5] But the Greek philosopher, Philolaus of Tarenturm (480—? B. C.) is also said to have first suggested about 450 B. C. that the earth was a sphere[6]. Notion of spherical earth has not been at all found in Jaina canonical literature whose present recension is traditionally ascribed to the council of Valabhī which met during the reign of Dharuvasena I (Ca. A. D. 519-549)[7]. It is, however, worthy of note that Jaina Monk Abhay Sagar[8] has very logically argued that the earth cannot be a sphere. His inferences are based on archaeological and geographical evidences, e.g. the earth distance in one latitudinal degree goes on increasing as one moves from the equator towards south pole where it should not have been so had the earth been a sphere. Even modern space observation has also led us to conclude that the earth is not spherical but oval-shaped.[9] In Sthānāṅga Sūtra, third aṅga (limb) of Jaina Canon of sacred literature[10], as Jaina Monk Nathmal[11] has

1. Bose, D. M., Sen, S. N. and Subrayappa, B. V. (1971). A Concise History of Science in India, p. 80.
2. For more details about the concept of maṇḍala, see our paper 'Notion of Declination Implied in the Concept of Maṇḍala (Diurnal Circle) in Jaina School of Astronomy. See also Lishk, S. S. (1978) Mathematical Analysis of Post-Vedāṅga Pre-Siddhantic Data in Jaina Astronomy. Ph. D. Thesis. Library, Panjabi University, Patiala.
3. For more details about the concept of mount Meru, see our paper 'Notion of Obliquity of Ecliptic Implied in the Concept of the Mount Meru in Jambūdvīpa Prajñapti—Jaina Journal, Vol. 12 No. 3. pp. 79-92.
   See also Singhal. B. M., Sharma, S. D. and Lishk, S. S. Concept of Mount Meru in Ancient Indian Geography (To appear).
4. For length-units, see our paper. 'Length Units in Jaina Astronomy'. Jaina Journal, Vol. 13, No. 4, pp. 143-154.
   See also our paper 'The Evolution of Measures in Jaina Astronomy' Tirthankar, Vol. 1 Nos. 7-12. pp. 83-92.
5. Nicolson, Lain (1970). Astronomy, p. 10.
6. Asimov, I. Op. Cit. p. 7.
7. For more details, see our paper. 'Sources of Jaina Astronomy' The Jaina Antiquary, Vol. 29. No. 1-2 pp. 19-32.
8. Sagar, Abhaya (a Jaina monk) :
   (i) What others say and a questionnaire.
       The Earth Rotation Research Series, No. 1. (Mehsana).
   (ii) Vijñānavāda Vimarśaḥ (in Sanskrit).
       The Earth Rotation Research Series No. 2, (Mehsana).
   (iii) Bhugola Bhrama Bhañjanī (in Sanskrit-Gujarati). The Earth Rotation Research Series, No.16.
9. Ramanathan, A. N. (1978) Is the Earth Pear-Shaped ? Science Today, Oct. issue. pp. 24-48.
10. See ref No. 13.
11. Private discussion with Yuvācārya

pointed out that the shape of earth is like Jhallarī (an earthern pot for cooking pulse) which is somewhat near the oval shaped body. Our researches are in progress and very interesting results are expected in future.

## 2. Theory of two Suns and two Moons

The notion of counter bodies existed in several civilizations. Chinese had imagined from ancient times the existence of a 'Counter-Jupiter' which moved round diametrically opposite to the planet itself ; Greeks had also a parallel to this in the strange pythagorean theory of the counter earth apparently due to Philolaus of Tarentum (480-? B. C.), which was devised either to bring the number of planets upto a perfect number ten or to explain lunar eclipses.[1] Jainas had also a peculiar theory of two Suns, two Moons and two sets of Nakṣatras (asterisms) which were assumed to move in circles parallel to earth's surface round the mount Meru It is worthy of note that because of notion of flatness of earth, Jainas could not solve the mystery of the theory of two Suns and two Moons etc. Jambūdvīpa (an isle of Jambū tree) is divided into four quarters and four directions. As the Sun should make the day in succession of the regions south, west, north and east of Meru, Sun's diurnal orbit is also divided into four quarters ; the same Sun making day over Bhāratavarṣa in the southern quarter cannot reappear on the following morning as it still has three quarters to travel. To obviate this difficulty, the theory supposes two Suns, Bhārata and Airāvata, separated from each other by half the orbit, to describe the whole orbit.[2] This theory is quite confusing these days, but it certainly depicts peculiar thinking of Jaina scholars. L. C. Jain opines that the mystery of the real and counter bodies existent in the Jaina Prakrit texts, China and Greece have not yet been unearthed, although it has been a theory for certain calculations.[3] In the light of fore-going discussion it may be contemplated that Jainas might have not necessarily believed in the actual existence of two Suns etc. For mathematical calculations, only one Sun, one Moon and one set of nakṣatras suffice. But this theory had served their purposes like those of tentative astronomical model of cosmos. This theory fairly worked over many centuries together for solving the practical problems Jainas encountered in formulizing the description of the real world around. More researches are being made in this direction and it is envisaged that since the actual length of a solar year does not exactly correspond to an integral number of solar maṇḍalas (diurnal circles), therefore the Sun on completion of its southern journey does not begin its northern journey at the beginning of a solar maṇḍala ; in other terms as the northern journey of the Sun does not commence at the time of sunrise as the southern journey of the Sun does, so there is a phase difference in southern and northern journeys of the Sun. To obviate this difficulty, it appears that the same Sun was called by two different names—Bhārata and Airāvata—in different contexts respectively. More researches are still in progress in this direction.[4]

## 3. The Theory that the Moon is 80 Yajanas higher than the Sun

According to Sūrya Prajñapti[5] (S. P. 18) it is stated that.

'The lowest star moves at a height of 790 Yojanas above the most plane portion of the earth. The Sun moves at a height of 800 Yajanas. The Moon moves at a height of 880 Yojanas. The uppermost star moves at a height of 900 Yojanas.'

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Mahāprajña Muni Nathmal, follower of Jaina Achrya Tulsi, leader of the Tera sect.
See also our paper "Shape of the Earth in Jaina Cosmography" (in press).
1. Needham, J. and Wang, L. (1959). Science and Civilisation in China, Vol. 3, p. 228.
2. See ref. No. 7.
3. Jain, L. C. (1975) Kinematics of the Sun and the Moon in Tiloya Paṇṇatti, Tulsi Pragya, Vol. 1 No. 1, pp. 60-67.
4. Sūrva Prajñapti. Sanskrit and English commentaries are in progress under the supervision of principal Investigator Dr. S.D. Sharma, Reader in Physics, Punjabi University, Patiala, Sponsored by Vardhamana Kendra, Ahmedabad.
5. Sūrya Prajñapti (=SP) Sanskrit commentary by Malaya Giri. Hindi translation by Amolak Rishi.
The SP is the 5th upāṅga of Jaina canonical literature. For more details, See ref. No. 13.

Other explicit references are
1. Jīvābhigama Sūtra[1] (=JS) .3.68.11
2. Jambūdvīpa Prajñapti[2] (=JP) .10.6

Evidently the Moon is stated to be 80 Yojanas higher than the Sun. Dixit[3] advocates in his Bhāratīya Jyotiṣa Śāstra that no stars are visible during day time when the Sun shines, but on the other hand, the Moon moves among the stars at night. Hence it was but natural for the people to believe that because the stars are higher than the Sun and the Moon moves in their region, so the Moon is also higher than the Sun. Nemichandra Śāstrī[4] also agrees with this hypothesis. The Siddhāntic astronomers were not attracted to solve the mystery of this peculiar notion. As a matter of fact, we have to delve deep into the secrets of Jaina astronomical system so as to comprehend the concept of height in its true perspective.

It was conventional to measure celestial north south angular distances in terms of corresponding distances over the surface of the earth[5]. Here the distances of astral bodies have been measured from plane portion of the earth (Samatala Bhūmi, a technical term in Jaina astronomy). Height of the Sun is always 800 Yojanas above Samatala Bhūmi. This suggests that Samatala Bhūmi denotes an area bounded by the locus of a point that remains always at a distance of 800 Yojanas from the Sun's apparent path, the ecliptic, and the plane of Samatala Bhūmi is parallel to the plane of ecliptic. Therefore the centre of Samatala Bhūmi lies at the projection of pole of ecliptic, over the surface of the earth.

It may be noted that the lunar orbit is inclined to the plane of ecliptic. When the Moon lies at its ascending or descending node, its height above Samatala Bhūmi is the same as that of the Sun ; however, the Moon on its journey from descending node to ascending node remains higher than the Sun with respect to Samatala Bhūmi Thus it appears that the concept of height of the Moon over that of the Sun above Samatala Bhūmi implies a notion of maximum celestial latitude of the Moon.[6] Therefore, it is evident that the concept of the word 'height' has to be properly understood in the given context. Such a view has also been expressed in Madanpal's commentary on Sūrya Siddhānta.[7] Such an idea of north or south position of the Moon relative to that of the Sun is also found in Goladīpikā[8] (2.31-32).

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1. The JS is the third upāṅga of Jaina canonical literature. For more details, see ref. No. 13.
2. The JP is the sixth upāṅga of Jaina canonical literature. For more details, see ref. No. 13.
3. Dixit, S. B. Bhāratīya Jyotisa Śāstra. Vol. 1 Part-I Eng. Tr. by R.V. Vaidya, (1969), p. 6.
4. Shastri, N. C (1973). Bhāratīya Jyotiṣa (in (Hindi) pp 45-46.
5. Lishk, S S. and Sharma. S. D. (1974).
   Post-Vedāṅga Pre-Siddhāntic Indian Astronomy. Paper presented at Summer School on History of Science (INSA New Delhi). To appear in K. C. Shastri Memorial Volume (Jabalpur).
6. For more details, see our paper
   Latitude of Moon as Determined in Jaina Astronomy.
   Shramana, Vol. 27, No 2, pp. 28-35.
7. Private correspondence with
   Dr. K S. Shukla, Professor and Head,
   Department of Mathematics and Astronomy,
   Lucknow University, Lucknow.
8. The Goladīpikā by Parameśvara.
   Edited with introduction, translation and notes by K. V. Sharma,
   Adyar Library Pamphlet Series No. 32.
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