Bhū-gola Tattva - Science of the Round Earth

Chapter 8 Virodha Mardana

By Yajñeśvara Śarmā (1830 CE)

Prostrations to Śrī Gaṇeśa.
Natvā Viśveśvaram devarh Vāstavārthaprasiddhaye
Virodhamardanarh Grantham vyācakṣee svakṛtaṁ tam mudā

I bow down to Lord Viśveśvara and shall now happily comment upon the work *Virodhamardana,* composed by myself, so that its true meaning is made to known to all.

Commentary**:** A certain Astrologer (Daivajña) Yajñeśvara Śarmā by name, desires to compose the work *Virodhamardana* by name, with a view to refute the apparent contradictions that exist between Purāṇas as and works on Astronomy like the Sūrya Siddhānta regarding matters like the size of the Earth. At the outset he performs the invocation of the chosen deity in an Anuṣṭubh verse so that the work undertaken may be successfully completed.

īśvaraṁ kevalaṁ naumi vicitra-aneka-śakdkam
Jagat-sarjana-samsthāna-tirobhāvādikāraṇam 1

(I bow down to Īśvara, the Pure One who is the repository of many amazing powers and Who is the primordial source of creation, sustenance, dissolution etc., of the universe.)

Commentary: The word *kevala* means *advitīya* or second to none, because Īśvara is the counter-correlative of the four kinds of non- existence.[1] Because He is eternal, He is of the form of Existence. As such He is present in every object. As far as the material world is concerned, its manifestation can be accounted for even otherwise. That is, its appearance is superimposed upon it, and it undergoes apparent modifications, which position is acceptable to the Advaitans who advocate the doctrine of Māyā. Therefore strictly speaking, the phenomenon of His being the counter-correlative of difference in relation to such a world does not exist at all.

Question: In such a case, how can the expression "I bow down" be used which implies the difference between the verb and its correlates?

Answer: The verse says, "the Lord is the repository of many amazing powers. " The word *vicitrā (śakti)* means that which cannot be specifically proved, but can only be understood through creation etc. of the world, which is of manifold difference. The word *anekā (śakti)* means that it takes different forms like *māyā* and *avidyā.* Īśvara has such a power. That is to say, all verbal reference that the world is created by *māyā* and *avidyā* etc. is a mere appearance in the Ultimate Principle, which is strictly speaking, indivisible.

Or, alternately, the word *kevalam* cannot be an adjective of the act of salutation. This is so because Īśvara being without a form, He cannot become an object of perception, So in regard to Him, activities like worship etc. become impossible. (Line That is why, in regard to Īśvara Who can be realized through scripture, other means of knowledge like Inference have no room at all. Keeping all this in mind, the author describes It with expressions like "creating the world" etc. The word 'tirobhāva' here suggests the "theory of Satkārya"[3] accepted by the Sāṁkhyas. The word 'ādi' includes liberation. A question may be asked as to how such an entity can attain the status of a cause. It is replied with the expression *vicitra.* etc. A question may be raised here as to how the Primordial Principle, can attain causality without any support or assistance. This is answered by the expression *vicitra* etc. Vicitra means manifold and variegated. This refers to the powers like Prakṛti (Nature) and subtle atoms. They become the co-operative causes for the Supreme Being.

Having thus set aside impediments through invocation, the author now undertakes to spell about what he wants to say for careful consideration of the listeners. This he does, in nine verses:

Sirasstha-aśesa-tarasya Brahmapdatmaka-varsmanah
Nābhyādipādaparyantarūpam nānarthasankulam 2
Pañcaśartkotisankhyāka-yojanavyāsakam mahat
Bhūmattdalam Anantadidhrtam tanmadhyasarnsthite 3
Ksārādivardhibhih dvipaih plaksādyaiśca suvestite
Jambūdvīpe daksiriato Bhāratam varsam asya tu 4
Navamo Bhāratah Khandah ksārābdhijalapūritah

Tanmadhy e'yam dharūkhandah dīrgho yāmyottaro'dhikah 5
Pūrvaparastu anaiyatyat vistrto vartate 'tra hi
Krtavatūraih Sūryādyaih Siddhāntāh parikalpitah 6
Ganitavyavaharaya tatra bhūmandalūdikam
Uktarn atyalpamanam yat tadevadaya tattvatah 7
Vicaro vartitastu Ārya-Brahmaguptādibhih naraih
Yavanaih Hūriadeśīyaih apt Siddhāntasamsthitān 8
Arthān sangrhya yatnena tathā pratyaksadrstitah
Kañcid bhūbhagam alaksya parilekho vikalpitah 9
Siddhāntānām Purānānām parilekhasya ceksariāt
Asmābhir avirodho 'yam vijnātah sa hi varnyate 10

Commentary: In the crown of the Cosmic (Virāṭ) Jīva who has the entire universe as his body, there are the Sun and other luminaries, which make its manifestation possible. This is on the analogy of the faculty eye, which illumines (exists in) the portion above the neck of all the human beings. Beneath the region of the stars like the Sun there is the Earth, which corresponds to a part of the body of the Cosmic Being. This (earth) is subject to modifications due to the influence of Māyā. Strictly speaking, that modification becomes infinite. Even then the expanse of that portion of the earth, which is circular in shape, can be referred to as either receiving sunlight (as being bright) or not receiving it (as being dark).

Question: How is it that this vast earth can remain sustained in the infinite space because it is very heavy and insentient (matter).

Reply: It cannot be presumed that someone is supporting it. Such a person, who should also possess a body, cannot exist in such a fashion without yet another support. By positing another support for that supporting entity, we land ourselves in the fallacy of *infinite regress.* Further, clusters of stars, all of which should again have a series of supports would have their course blocked. They cannot then rotate upwards or downwards, which movements, we are able to perceive. By merely presuming that all such supporting principles exist without any form (cannot thus be seen), we do not benefit from such a presumption because, after all, they do not exist (being merely fictitious). That is why the author has used the word *Anantādidhṛtam* (supported by Ananta and others).

It is a matter of practical experience that though the vital breaths etc. are without any form they still support the body. In the same manner, we can account for the fact that the Cosmic Prāna itself can provide support for all the planets like Earth. That principle is known by terms like *Pravaha* (one of the seven courses of the wind, said to cause the motion of planets) and *Śeṣa* (Primordial Serpent) in accordance with the divisions of space like heaven and earth.

The Tortoise (Kūrma), which is at the base of Earth is one aspect of the Cosmic Being. The Varāha (Boar) forms its support. This is another aspect of the Supreme Lord (Īśvara) who supports everything. All these are said to be the various forms of the thousand- hooded Serpent occupying the nether world. This is meant for facilitating contemplation (by devotees).

All the planets rotate crosswise like an umbrella. But because of the distance between them and the observers, they appear to be moving upwards and downwards. This point is going to be explained later. So, their apparent revolutions around themselves cannot be considered as the result of any error. The Continent of Bhārata (India) is the land that is bounded by the Salty Ocean towards the East and the West. It is also bounded by Himālayas and Salty Ocean again (towards North and South). This portion of the earth is shaped like a bow *(dhanus).*

One-ninth of the total landmass is occupied by India. Foreigners refer to the total landmass by different names like Europe, Asia, Africa and America, and the entire landmass is surrounded by Salty Ocean.

The Sun (God) and “others” incarnated in this world of mortals, due to some curse *(śāpa).* The word “others” implies such persons as Soma, Brahmā. Vaśiṣṭha, Vyāsa and others. In works composed to provide mathematical calculations relating to space and time, the size of Earth is given as very small. In the Purāṇas, it is said to be more than 1½ lakhs (of miles). Based upon what is being seen in our system, we can understand the calculations prevalent in other countries. As a matter of fact, people have their own calculations, disregarding the details given in Purānas. In works composed by foreign scholars, we find discussions on the issue whether planets do have or do not have, any support.

The word *yatnena* (with effort) (verse 8 above) means this: activities such as travelling by a huge ship and reaching inaccessible places. The word *parilekha* (same verse) means a map of the earth.

Question: If regarding one and the same matter, one comes across mutually contradictory evidences, one has to settle the issue, depending upon the relative strength or weakness of those evidences. Accounts given in scriptures like the Purānas do not tally with what is observed by direct perception. Thus the statements made by works like the *Sūrya Siddhānta* become stronger than those found in Purānas.

In the face of contradiction, the statements of Purānas can only be taken in a secondary sense. How can one say that the statements made by Astronomical Works are spurious and unreal?

One may argue as follows: "The earth is small in size and is insentient. How can it stay in empty space? Nobody can demonstrate that it has forces like gravitation, which are seen in all the mobile and immobile entities in this world. Such powers cannot be assumed to exist.

But this doubt can be cleared in the following way: The upward and downward rotation of planets, which have their axis between the two Poles cannot be directly perceived because of the enormous distance. Therefore this may be explained away as an erroneous perception. The Siddhānta text can also be considered in the same manner. For instance, we measure the moon with the span of the thumb and forefinger; the distance between the moon and us is not considered as the outcome of any erroneous perception. Likewise the perception of planetary positions cannot be considered as a flaw, although there is enormous distance between our sense-organ and the object. For example, there cannot be any contradiction when one says that Garuda is present in the place to which Rudra has descended. There is a great pull exerted by mighty planets like the sun on other heavenly bodies. This facilitates the presence of other planets in space. There is no contradiction here. One can also explain the power of attraction between planets on the analogy of a magnet and a piece of metal iron. It cannot be argued that all cases of direct perception are erroneous.

Then the Vedic statement “The Sacrificer is a bundle of grass” becomes secondary in import. Then the validity attached to it by Mṛmāmsakas becomes irrelevant. This cannot be accepted.

The Sun, during a particular time, appears to be rising at one place and as setting at another place, during the same time. In the same way, luminous bodies in the sky which appear to be distant, more distant and at still more distant, are seen to be low, lower and lowest in the horizon. This is a matter of direct perception. Therefore this will be contradictory to the declaration made in the Purānas.

This can be accounted for on the ground of defects in the sense faculty of a person, and also on the ground of the distance and smallness of size in regard to objects. Perception is considered valid only when there is a flawless sense-object contact. Perception of objects, which are at a great distance, is prone to be defective and erroneous.

Hence statements found in the Siddhānta texts (Astronomical works), which normally go by the available data, are mere restatements of what is noticed earlier through perception. So those texts become authoritative only at the empirical level. We are going to state later that it is virtually impossible for anyone to make one particular area in India as the starting point, take a huge ship and travel to other areas (referred to in Purānas), which are covered by oceans of salt water. Foreigners have conceived the shape of India in a particular way. Beyond India lies the continent of Kinnaras. Their existence because a matter of perception only for those who can go there.

Since the statements made in the Purānas and Siddhānta texts are equally powerful, one cannot be stultified by the other. We should note that the calculations found in the Siddhānta texts are helpful in understanding the calculations made by scholars regarding other countries. This position has been accepted by the Purānas. So, calculations relating to our planet Earth are quite significant. This point will become clear in the subsequent portion of this text. One may raise an objection: “This kind of settlement of issues has not been categorically accepted by our ancients who knew both the Purānas and the Siddhānta texts. As such how can you claim this as a new discovery? ”

This has been answered: *"parilekhasys ca īksanāt "*, meaning, "by looking at the map. " Experts among foreigners drew the map of earth based upon their own experiences. Ancient writers like Bhāskarācārya did not see this map. Even though the descriptions found here (in modern works) were not available in ancient times, we see no mutual contradiction.

The author has so far enunciated the intended hypothesis. He then mentions the cause behind India being surrounded by saltish waters, as given in the *Sarvabhauma Siddhānta* and other works. Sun God and others who came down a incarnations, observed the Pole Star etc. and made their own presumptions. The methodology adopted by them is being explained by the author in the next 15 verses.

Viśalabhūsthitaksāra-pathodhi-himaśailayoh
Antargatasya varsasya Bhāratākhyasya paścimah 11
Bhago Bhāratakhatidakhyah Sagarsya atmajaih purā
Ayodhyām abhito 'śv art ham krte khāte samagataih 12
Ksaravārdhijalaih vyaptah śuskah Kamathaprsthavat
Āśiyadi-mahadeśa-catuskatmaka eva hi 13
Uccavaco 'sti yanmadhye drśyeta śirasi Dhruvah
Laksyat sa pradeśo hi himaksārajalānvitah 14
Tasmat samantatah pañca-sahasrakrośa-sammite
Deśe vilokyamānastu Dhruvo bhūlagna īksyate 15
Drastuh dūratrvatah tad vat taddeśādapi daksine
Mahāksārāmbudhau naubhih gamane'nyo 'pi drsyate 16
Daksmottaratarāsu dūratvāt dhrauvyadarśanam
Yujyate hi tato 'rkādyaih Dhruvayugmam tadaśritah 17
Bhagolaścabhito bhūmirn ākāśo'stīti kalpyate
Tathā bhuvi Dhruvauccyasya tārataniyapratītitah 18
Bhūrneh kandukasadrsyam yuktya ca atyalpamānatū
Sarvatah pavataranyaprāmprabhrtisamsthitih 19
Prakalpyate tathā nityam Grahatā ro d ay as tay o h
Anyathānupapattyā tu tanmadhye samsthitih tathū 20
Nirādhāratvam ādhāra-nyūnatve 'pi acalatvakarn
Ākarsakatvaśaktiśca kalpyate tatra lāghavat 21
Kaiścit svānge bhramah spharyam abhitaśca bhramo 'paraih
Evam bhrama-pramārūpa-pratyaksādhīna-yuktibhih 22

Vividhah kalpita arthāh śraddha-jādyacca taih punah
Purānokta-rnahābhūmi- sthitam Hemādripiīrvakam 23
Atraiva tii catuhkharide Bhūkhande kathyate 'khilam
Tamravaktradibhistvetad Mervadyam apalapyate 24
Kutrāpyadarśanad atra tadanyat laghutadikam
Siddhāntoktam tu yantradiyuktibhih pratipādyate 25

Commentary: It has been stated in texts like the Viṣṇupurāṇa that towards the west of India, which is bow-shaped, live the Yavanas (cf. *paścime bhāge pūrve caiva Kirātakāli).* The habitat of the Yavanas has been thus referred to here. A large number of Yavanas have been living in the Continent classified by foreigners into four units. Fourfold classification of caste (in the Hindu texts) was made at the advent of the Kalpa (aeon) itself, due to this reason. It is only now that this fourfold classification became blurred since nobody follows the respective codes of conduct. That is why, the whole area (outside the Himalayan range) is called western. The world map was drawn by foreigners in different ways. In the middle is shown the land concealed by the Himalaya. At the top is shown a cluster of stars shaped like the Swastika Symbol. To the north is the Pole Star, Dhruva.

The word *drśyeta* (may be seen) indicates that it is a matter of possibility. But nobody has so far gone there. That area which is indicated by a circular line drawn by a thread which is as long as 5000 *krośas* taking Dhruva as the central point, is known as Nirakṣa (that which has no Axis or Terrestrial Latitude). Here the southern and northern poles look like stars whose rotation cannot be noticed. They seem to rise and touch the earth.

This is according to the School, which follows the Solar tradition. As a matter of fact, a circle drawn with a thread that is equal in length to 3200 *krośas* (1 *krośa* = 2 miles) will become the equinoctial line. Foreigners will have the same kind of experience with the help f their own machines. The equinoctial line, which is equal to 20, 000 *krośas* become the radius. (1. 3) A person who moves from such a place called *Nirakṣa* either towards north, or south will be able to see the two poles at a very high altitude. Such an altitude is called Akṣāṁśa (Terrestrial Latitude). Foreigners could only go up to that area which lay 80° Latitude.

Question: How can such a position be accepted by those who follow the Purāṇas?

The Stars which are in the higher regions are similar to earth etc. and they are believed to be rotating crosswise like an umbrella. Because of the distance, their exact size may appear to be different. Still in those planets, which are similar to each other, their shapes like being convex, circular, box-like, being concave etc., are not visible. Likewise, their movements are also not directly visualized. Because these features cannot be explained otherwise, it is proper to hold that the shape of Earth is circular, being circumscribed on either side by the Poles. In reply to this, the author says: "*draṣṭuḥ*" etc. When birds take off from the surface of the earth and rise to the same height, those birds, which come closer to each other in the middle and rise higher and higher, or go away from each other and fly at lower and lower altitudes, can be seen by direct perception. The same principle can be applied to stars of the same magnitude. Depending upon the difference in their proximity etc., they appear in such a manner. This point is already stated.

Their appearance in different shapes as being convex, basket-like and being concave etc. can satisfactorily be explained. The circle drawn towards east and west of the area called *Viṣuva.* This has no axis form the topmost point of the stars, which exist to the south and north.

Because of the difference that exists between the sides which are formed with the help of pegs, the circles drawn on their basis will have different latitudes that less, lesser and least sizes. Therefore their rotation can be directly seen. This is acceptable to Astronomers also. But the movement of starts, which conjoin in the higher regions both in the south and north, cannot be seen. They merely appear to be rotating and so we can consider them as stationary. Because the perception is held to be valid, the shape of the earth marked by the two Poles at the either end, cannot be considered to be factual.

This explains the perceptibility of the rotation of the sun and other planets in the upper regions beyond the *Nirakṣa* area. These planets move about within the region that is above the *Mānasa* Lake and the Himālaya Mountain, during equinoctial days. It becomes possible to perceive that the size of the planets is small; that they are perceptible like any other object. Even the gigantic size of

their axis appears to the smaller; they can be seen to be moving upwards and downwards.

It may be argued that to a person who moves in a gradual manner in the *Nirakṣa* area of our earth, the eastern and western directions also would appear to be different. As a result, the Poles existing in those directions must appear to be many in number. This is different from the viewpoint of the *Purānas* and the Siddhāntins (Astronomers).

This allegation is unwarranted. The actual Pole Star mentioned in the Purāṇas is only one. But the plurality of specific stars that appeared to be the Pole Star in the south is opposite the Northern direction. This has been taken as the basis of the Purāṇic statement. This plurality has to be accepted since thee is no other bass to justify their existence. So the view of the Siddhāntins, that there are two stars cannot be justified.

Only then the long-standing confusion among the Siddhāntins that there are two stars (Pole Stars) becomes explained. They accepted that the celestial bodies move by the force of a wind called *Pravaha*. It is therefore proper that the author has referred to the Northern and Southern Stars.

So an observer standing on the top of the earth will be able to see only up to a distance of 3200 *krośas* around the place where he stands. He also sees that the stars above are rotating up and down, assuming the shape of a convex vessel. But in places where the ocean has become solidified like ice, (Arctic and Antarctic Regions: Glaciers) he will be able to notice the stars moving cross-wise like an umbrella at the top. Likewise, a person observing from the area called *Nirakṣa* will see two Poles as rising from their original place. Their movement is not noticeable in the Southern and Northern directions. They (the two Poles) appear to be in contact with each other. They are called *Unmaṇḍala*. That particular area will appear to him as situated at a lower level and also at a higher level from both the sides, depending upon his position. That itself, appearing as two poles from the equinoctial point covering south and north, is called *Lamba* (Co-latitude of a place in degrees) when it is low.

When it is at an altitude higher than the Mars, it is called *Akṣāṁśa* (Terrestrial Latitude). This position of the Equinoctial circle towards east and west of the

Mars is explained efficiently in works like the *Golādhyāya.* This is quite well known.

Likewise, the area, which is now called America, lies towards the north of the land seen from the Northern Pole. It can be surmised that the Earth, towards further north, which is the third Continent, is like a small circle. The concept of East and West, which is based upon sunrise, gets reversed here. This is a matter of practical experience. Therefore writers on Astronomical Works accepted that there are only two Poles, based on the assumption that they lie southwards. Such a view is helpful in referring to various directions in our present continent.

This view expressed by the author of the text Vāsanāvārtika and others, has been modified and restated by us in our *Vimatikhaṇḍana.* Since the rotation of celestial bodies in the sky which is perceptible to us cannot otherwise be accounted for, it must be admitted that the Earth exists in the sky by her own power, without any other support.

The Sūryasiddhānta states:

Madhye samantad andasya Bhugolo vyomni tisthati
Bibhrārtah paramam śaktim Brahmano dhāranātmikcmi

(The Earth exists in the sky, in the centre of the Universe. It has the supreme power of the Lord, which alone support it.)
The *Śākalya Samhita* also says: *"khe blnIh tārksyavad āśrite"*
(The Earth depends upon the sky like Garuda).

Objection: "Foreign Astronomers of yore, have understood that water supports Earth; because the mass of Earth cannot remain by itself (without support) in the sky, some kind of support is required. A major portion of the earth has sunk into the salty waters of the ocean. Everybody can perceive this.

Answer: But this argument is not correct. Such water (salty water of the ocean) is available in plenty beneath the earth. This will prevent its movement among the celestial bodies, which are all controlled by the sun. The Sun, by his very nature, is opposed to water.

Further, when water is thrown up into the sky, it falls down on the earth. This is also perceptible to everyone. So, earth forms the support and water becomes the supported. That means, everybody knows: “This water is present (rests) on earth. ”

As such, if earth itself depends upon some other Element for its support, then that other support also requires another supporting factor. This will rule out the possibility of its rotation among celestial bodies. This problem (raised earlier) remains unresolved. Further, if the earth is supported by water and exists in water, then there is the contingency of its melting away in water and losing its essential form.

If it is argued that such a supporting power has to be accepted at any cost as being present in some ultimate support so as to avoid the fallacy of infinite regress, let that power be accepted to be present in the earth itself.

Why should one go a long way? Astronomers state that the earth exists in sky and that it is surrounded and supported by either by the pull of other planes or by that of the two Poles. They accept that a cage-like cluster of stars surrounds earth, which is spherical in shape. They say that the earth remains in the sky like the metal iron, which gets stuck to a magnet.

Others, however, argue as follows: The experience of the fruits of past actions does not happen in the case of souls unless they have a physical body. That body itself depends upon some kind of support. That support is provided by the unseen power called adṛṣṭa belonging to a particular soul.

This is not logical. It is reasonable to hold that the power of a given body alone supports it, rather than holding that that power exists in a different entity. In the Purānas it has been stated that Śeṣa, Kūrma and other incarnations (of God) are present in the Nether World *(pātāla),* which forms the bottom of the earth itself. Still, these forms are supporting that portion of the earth, which rests on the top of the Nether World. That the entire planet Earth is being supported by these forms can be understood in a secondary sense and so there is no contradiction here. Hence statements found in the Saṁhitā that earthquake is the result of the King of Serpents (Ādiśeṣa) bending his hoods pressed by the burden of the earth also become justified. This (earthquake) should be taken as a local phenomenon

(only). Otherwise, all countries must experience earthquake, simultaneously. However, it is a matter of practical experience that people living in certain parts of the earth only feel the tremors. Hence, in the expression earthquake, the word "earth" should be taken as referring only to a part of the earth, in a secondary sense.

Objection: Further, in the Purānas, specific periods in which the incarnations of Ādiśeṣa and Kūrma took place, are mentioned. Then it must be accepted that Earth existed in the sky prior to as well as subsequent to the appearance of those incarnations. Then the assumption that these incarnations like Śeṣa and others would become purposeless. To avoid this difficulty, the view held earlier must be accepted as correct.

In the text called *Siddhānta Sundara* it is stated as follows: "There is nothing wrong in accepting that Ādiśeṣa and other incarnations exist, supporting the earth, extending as far as 12 *yojanas* underneath the earth, up to the point where the wind called *Pravaha* is present. " This cannot be correct because the defects pointed out earlier still persist. It may be argued that Varāha being the incarnation of Viṣṇu, has the capacity to be present in the sky also. But on the same token, it can be argued that the earth also possesses such a capacity since it is also a manifestation of divine power. This is in fact, supported by scriptural evidences. Further, the existence of landmass under the globe of earth is not well known.

To explain: Since the mobile and immobile entities exist all over the surface of the earth, and since the sky also is even, earth alone should be accepted as existing at a lower plane than everything else.

The Sūryasiddhānta says:

Uparyatmanam anyonyam kalpayanti Surāsurāh
anye 'pi samasūtrasthāh many ante 'dhah parasparam

(Gods and demons consider themselves as mutually existing at a higher level than each other. Others living on an even plane think of themselves as mutually lower to one another.)

The *Bhāskara Siddhānta* states:

"Yo yatra tisthatyavanītalastham
Ātmānam asyā uparisthitam ca
Sa many ate " etc.

(He who stands on a particular spot on the earth thinks that he is standing on the top of the earth only.)

So this is the universal experience of all who live on earth viz., that they live on the surface of the earth. The place beneath earth is not specified in this manner. Whenever earth is referred to, it is only the surface that becomes the object of reference. The vast expanse of sky that is present above the planet earth is always referred to as the "upper region. " So earth alone is to be taken as supporting all. Hence the so-called "lower portion" of the earth (as a separate entity) does not exist. Then in which part of the earth's surface should such a power be posited?

You may argue that such a power can be posited *somewhere.* Then, there being no specific regulating phenomenon behind such an assumption, that power can be presumed to be present all over the earth. Further, whichever factor is presumed as the support, that support forms part of the earth itself. Principal mountains like the Sahya are called dharādhara (supporters of Earth). So earth should only be accepted as an entity that is supported (*ādheya)*.

What is wrong with this? Therefore, references to the lower part or upper part of earth are not quite popular or well known. So the question of earth requiring a support doe not arise art all. As such, it is proper to assume that the earth exists without the help of Śeṣa and others.

By this declaration the view entertained by the Jains that Earth always goes lower and lower under its own weight, is set aside. If that were true, then, earth being very heavy, it should quickly fall down and break up. (1. 9) Then those who live on its top being lighter (in weight), they too would fall down and break up into pieces. There is then the contingency of their never reaching the surface of the earth, which has fallen down forever. It is seen that when a boulder falls down from a mountain, the grass etc., which gets uprooted by it, also falls down.

Because of the contact of the plant etc. (with earth) is quite strong, the blade of grass may not lose its contact with earth. But in so far as body etc. of human beings are concerned, when they fall along with the earth, their contact with earth becomes loose. Therefore, there will be a delay in their falling down as in the case of blades of grass, uprooted by falling boulders. When a clod of earth is thrown up into the sky, the contingency of its touching the earth even after an aeon may arise. The earth, even after a few days, will be reaching the area, which is underneath other celestial objects. Then, it must be in a position to be seen all the time because it comes under the jurisdiction of the Sun etc. This will lead to the contingency of an unending night. Then there will the problem of unsteadiness in the distance (apogee) of the Sun every year, which apogee has been determined with the help of instruments. That again will lead to the situation where the Sun and other planets will appear to be extremely small in size.

The statement that Earth falls down along with other celestial bodies is illogical and daring. Therefore, since the question of an object coming down to the earth after being thrown up into the sky cannot be explained otherwise. There must be a necessary positing of some factor, which is responsible for the slow descent of the earth. In the light of this, it is is appropriate that we justify its stability somehow or other.

Then let the view held by the Buddhists about objects thrown upwards be accepted. They say:

Utksiptā svayam utpatadbhir ahirāt-kūrmendra-dikkuñjaraih
Dūrākarsana-śaktimadbhir avathu (?) naksatra-tārāgrahaih
Nitye śāśvata-vaibhave niravadhau vītādhvabādhe viyad-
vartmanyūrdhvam anāratam Bhagavatī Viśvambharā dhāvati

“The adorable Earth throws itself up into the sky and runs incessantly in the aerial path, which is eternal, ever-dazzling, limitless and unobstructed. In this act, the Earth is joined by others like the King of Serpents, lordly Kūrma, and eight quarter-elephants, all of whom have the capacity to attract the earth to a long distance and also along with lunar mansions (nakṣatras), fixed stars *(tārās)* and planets (*grahas*).

But the action called *"patana"* (falling down) which is the noninherent cause (*asamavāyi-kāraṇa)* of weight *(gurutva)* is not well known (among scholarly circles). As for the defects in this view: (first of all) (a) positing more than one action to several objects is cumbersome. (b) There is economy in admitting that Earth is alone is moving upwards. (c) In the case of grass etc. (which have been uprooted by a falling rock) the act of their falling, being devoid of speed, they become steady (motionless). It is possible to explain that they come into contact with earth, because the latter rises. (d) Further, the verb *"pat"* (to fall) can denote the act by which an entity moving upwards (in the sky) can come into contact with another object.

That act is nothing but "losing speed. ". Further, when the earth moves upwards, the propelling is done by the King of Serpents and others, which form its support. According to the view that earth is steady (motionless), the objects thrown into the sky would never be able to contact the earth. If an act called "falling" is accepted, then the earth which remains in the sky without any other support, will have to fall down.

Here is our reply: If the objects existing on earth are not accepted as liable to fall, then the following problem would crop up: Supposing a person stands on the surface of the earth and holds a needle on the tip of which is kept a mustard seed, that seed should never fall down (according to this theory). On the other hand, due to the power of the earth, like the person who holds the needle, the seed being pushed by the needle, should only go upwards. However, this view cannot be accepted. Also in such a case, a stone and a bundle of grass which (for the sake of an argument) have fallen from the top of a mansion at one and the same time, will not be able to reach earth one after the other.

According to the theory of velocity of a falling object, a stone because it is heavy, will come down at a faster pace. Although the stone is at a greater distance, it will quickly come into contact with the lower portion of the earth.

Question: Even those who accept the theory of the object being thrown up, will have to admit that there is what is called "being pushed downwards" when the object starts coming down. When a cloud is rising up, drops of water which come down from it will come into contact with earth when the earth moves upwards. Smoke and clouds, which can rise upwards will not come into contact

with earth. Therefore, depending upon the presence of force or otherwise of an object going upwards, a rock and a bundle of grass falling from the top of a mansion comedown slowly or quickly.

They will come into contact with the earth when the latter goes upwards. The earth can move upwards being pushed by the powerful winds blowing from the lower region. Then, it may be asked as to how this takes place.
Is it due to the quality called the weight? Is it due to the act of falling? Or, is it due to the power of stability, which is opposed to the act of falling? That is why, within a vacuum found inside a machine, which exhausts wind, both the heavy and light objects will come down with the same speed.

This cannot be true. If it is admissible that the earth etc. have the nature of moving upwards, then the space between the surface of earth and the orbits of the planes and stars, which have been arrived at by calculation of "three Rāśis", will be increasing every day. As a result, all the planets will come very close to the earth. They should then be visible with a huge size. If the orbits of the planets also rise up, then there will be a continuous upward movement of several planets, stars and other worlds along with their constituent parts. Therefore, in comparison with this, it is simpler to accept that a few heavy objects alone fall down.

Then, let a section of Jains (who argue that everything is indeterminable) accept the view advocated by Āryabhaṭa and others. Thus if it is acceptable that the vast galaxies and their components are rotating in such a fashion that they face the western direction, then it will be cumbersome. Instead, it will be simpler to admit that the earth alone faces the eastern direction and rotates around other stars and heaven, like a potter's wheel. Then the feeling that the earth is rotating, which feeling is conditioned by the movement of other celestial bodies, is a matter of illusion. People standing on the surface of the earth will have this feeling. A person travelling in a ship at a great speed feels that the trees and the shore are coming in the opposite direction. This is an analogy we can give for the phenomenon mentioned above. The reference to the rising and setting of planets and stars is dependent upon the proximity or distance caused by the rotation of earth. Vṛddha Gārgya had said the same thing:

Anulomagatam nauhsthah paśyatyacalam vilomagarn yadvat

Acalani bhanti tadvat samapaścimagani Lankāyām

Therefore, assumption of the unpopular view that winds called Pravaha, etc., support earth is of no avail.

Further, a bird like hawk which has travelled in the sky and returned, can reach the tree on which it has built its nest. This phenomenon cannot then be satisfactorily explained. There will then arise another difficulty also: The flags on a banner which are wafting due to the wind generated by the speed of the earth's movement, should always flutter towards the west only.

It maybe contended as follows: There is a special kind of power within the earth itself, by which the earth also moves along with the hawk and other birds that fly upwards. Therefore, those birds are able to reach their nests. Likewise, when a stone is thrown from a particular spot, it will fall at the same spot. It may be argued that the ordinary wind that blows is more powerful than the wind produced by the rotation of the earth. Therefore, the movement of the flags will not be in conformity with the movement of the wind. Strictly speaking, the birds, which fly off, are not in contact with earth, which moves upwards. So, the relationship between them is not the one that exists between a carrying agent and the object carried away. It is also not proper to accept such a power and a corresponding rotation in earth which is insentient. Even the presumption that the ordinary wind which is more powerful, is the outcome of the rotation of earth only, is improper. That is the why the commentator has said that assuming the rotation of the earth and other planets around the Sun and assuming the rotation of satellites like the moon, has to be properly considered. So, it has to be accepted that the earth is stationary and free from movement of which, all the people are aware. These qualities are natural: The sun and fire are, by nature, hot. The moon is again cool by nature. It also melts.

Question: If the earth is stable by nature, then even a clod of earth should also share the same qualities. Liquidity, for example, which is seen in water, can be seen in a part of water also. So, the act of water falling down when thrown upwards, which being experienced by all, cannot be explained.

Earth etc. contain a specific quality of viscosity. Therefore, a portion of entities can be drawn towards. Clay and the like, are, by nature, stable and not moving.

But they are able to come down and contact earth. This can be explained as caused by the power of attraction (gravitation).

F.10a, line 1: But *gurutva* (weight) etc. are not accepted as the non- inherent cause of the fall of objects. Otherwise the extremely heavy bodies like the moon and the sun should also fall down. That is why bodies of certain living beings which are intercepted midway from the earth will become topsy-turvy. There is no doubt about their falling down. If the power of gravitation is not accepted as present in the earth, because of the contradiction presented by its being insentient which is a matter of perception, we have the following problems:

Although a magnetic stone is also a stone, still only the former has the capacity to attract but not any other stone in general. Therefore, one has to admit that the nature of objects varies from object to object. In the same way, the earth, which is an abode of mobile and immobile beings, is unmoving and steady. This quality cannot be admitted in a lump of clay. This is its nature. By this assumption, there is nothing wrong if one accepts that weight is responsible for the falling down of clay etc. The moon and other bodies are being held in the galaxy by the winds called Pravaha etc. So, although they are heavy, they do not fall down. You cannot argue that the existence of the wind called Pravaha cannot be accepted because there is no evidence in support and also such a presumption becomes cumbersome. You cannot also argue that it is parsimonious to accept that earth alone rotates because we have to account for the rising and setting of stars, notwithstanding the admission that the planets found in the galaxy are stable and not moving and that they face East from the very beginning.

According to the works based upon the *Sauramāna,* wind is only one that alone moves. But earth etc. which are stationary and immobile, can be spoken of as moving, only due to their association with the wind. Then by the same token, it can be stated that the eastward movement of the moon etc. is also due to the power of Pravaha. This is most parsimonious. On the other hand, those who argue that the earth rotates and then along with earth, a large number of celestial bodies like the moon also moves. This leads to the assumption of several types of forces *(śaktis).* This will be extremely cumbersome.

Question: There is no such entity called wind at all. So the statement that it is moving is also a matter of assumption and super-imposition. The movement of

trees which is seen by us is caused by a specific type of contact of different types of living beings which possess very subtle bodies formed by particles of earth etc. As these living beings move freely in different directions, they produce movement in the trees etc. The faculty of touch belonging to the bodies of such living beings is being felt by people living in this world. So, compared to the assumption that many entities (planets) have the feature called movement, it is more cumbersome to accept a specific entity called Vāyu.

Answer: This is not correct. Bodies of humans and others are seen to move only due to their association with the wind (inside the body) called Prāna. So we have to accept that even such bodies need support of Prāna, a special kind of wind; otherwise even dead bodies will have to be admitted as mobile.

It maybe contended that there is no movement in the dead bodies because that particular *jīva* is not present there anymore. But even in corpses, it is seen that *jīvas* such as ants which can move everywhere, enter through mouth and other openings. So, like the earth which is an object of experience for all the people, wind also must be accepted as existing. This cannot be denied by you, at any cost. By this argument, we have also set aside the view that only such souls which are atomic in size and are eternal, can carry out the functions (cause the movement of) of celestial bodies also. The main objection is this:

The movements of celestial bodies can be explained with reference to the rays of the sun (sunlight etc.). This is admitted on all hands. So it is established that the cosmic Prāna, which assumes different forms like Śeṣa and Pravaha alone is supporting the entire universe. Therefore there is parsimony in the views held by those who follow the Solar tradition.

Question: Let the earth remain without any support and let it be stable. But, you cannot explain how it has become spherical in shape. It is experienced by all the people as flat and even. That is why the Purāṇas refer to it as shaped like a mirror etc.

Answer: A person who moves towards the East and West from a point on earth will understand that the earth is only spherical in shape surrounded by satellites like the moon. In this way, there are a number of suns, which shine in the vast firmament. They help all the living beings existing in planets and satellites,

which belong to major stars. On the basis of that, we declare that there are various powers behind these galaxies which attract each other and behind which there are factors such as largeness and affinity.

Commentary: By the statement that the huge landmass with four continents is circular in shape, other factors like its existence in space and that it is not supported by anything else, are briefly indicated by the author. So, the opinion held by Astronomers that earth is spherical and that it is not supported, holds good. Taking the steady sun as the starting point, when plane move to the east or west, the place from which a person comes out, will be a matter of direct experience to that person. Insofar as the rise and setting of planets in different regions are concerned, each area towards the east and the west, will, in an order, be visible to those who live in those regions. So, areas which are elevated and those which are at a lower level, will be understood differently with the help of certain instruments depending upon different areas, but at one and the same time, in relation to the permanent bodies like Poles etc. So, the statement that the measurement is lesser in front and that the gap that exists appears towards north, holds good. That is why several factors like the following, come up: 12b, line 9: It is presumed that the measurement changes in Saura and other systems. It is possible that planets like the earth, which by their very nature move upwards, are attracted by hue bodies like the sun and keep rotating around them. The phenomenon of the rising and setting of permanent stars like the sun, satellites like the moon and other planes like the earth is admitted, only by presuming that they rotate and also move upwards in that movement. Their rise and setting should not be interpreted by the presumption of special kind of wind called Pravaha and other celestial bodies. It cannot be logically explained that the wind Pravaha, which is confined to a particular direction, is capable of rotating around the entire stellar system because huge galaxies cannot move on their own accord within a measure of time equal of 60 ghaṭis (one ghaṭi = 24 minutes). That the two properties like largeness and viscosity have the power to attract bodies, is proved by the illustration of magnet and drops of water, which hang from the tip of a finger (for the sake of argument). So, arguing that earth etc. move upwards in their position is very insignificant.

This is because we cannot admit several categories like heaviness, which become the non-inherent cause for the act of falling. Thus, earth, which rotates around itself, has the natural capacity to move upwards along with the power of

attraction exerted by the sun. It moves around the sun like the wheel of a chariot. Thus it is possible for earth to move around the sun in this manner once a year. This way, we can satisfactorily explain that the sun, which is a fixed planet, can also see the vast expanse of stars like Aśvinī. In the same way, all those stationary stars around which the earth and other bodies rotate, which are themselves, circum-ambulated by satellites which keep moving, must be accepted as so many suns.

Since they are at a greater distance and higher altitudes, they appear like small twinkling stars. The living beings abiding in those plane and satellites will have these experiences. It is quite possible to say that there are a number of suns in the vast expanse of space. This point is quite evident in ancient texts. So the argument that earth is stationary must be considered as based on blind faith. The Paurāṇikas and Siddhāntins did not confirm this fact by using special equipments like the ship and also, the existence of the earth and other planets which were there even in the bygone past (harśalāgha)?

Then the author, in a single verse, points out that there is no justification in presuming that there is contradiction between the Paurāṇika statements, which are factual, and the statements found in Siddhānta and other texts, which are based upon conventional reality. This he does, not by referring to the prevailing viewpoints:

Ityādikam svato dustapratyaksāśrita-yuktijam
Matarh katharh bādhakam syāt Purānānām nigadyatām (33)

Accordingly, the perception of rotation of celestial bodies up and down is vitiated by certain flaws in the piece of land known to us as forming part of Bharatakhaṇḍa.

This perceptibility has given rise to the Saura and other Siddhāntas. Likewise, in the vast earth, which is described in the Purānas, a number of continents - small and large, are seen to be present by those who live there. The Siddhānta statements, which rely upon those perceptions, and statements which are found in other astronomical works, can form suitable examples for the analogy of “frog in the well. ”

Question: If the Siddhānta statements are explained as supporting the concept of earth etc. as discussed so far by us, then, what about the experience of foreigners who, by their peregrinations, started from one point and reached the same point later? This cannot be brushed aside as erroneous because nobody has so far disputed this claim. The measurements etc. given in works on astronomy concern the entire earth. There is no factor here that would contradict this position. The statements of the Purānas, however, can be justified as laudatory passages (arthavādas) connected to some injunctive statements (vidhis).

Answer: This cannot be so. A person going from left to right around the land demarcated by the glacier and which area is seen to be stationary can reach the same point from which he started earlier and circum-ambulated. But we are used to the idea that the earth is spherical and small in size which knowledge has come to us through Inference. By going to the lower regions of the earth, we feel that we have come to the same point. The rising and setting of stars as taking place at one and the same time and that the lower and higher latitudes of different regions are mutually distinct from one another. So one has the feeling that planets are far away at higher altitudes. Our understanding that the heavenly bodies are spherical in shape and that they are based upon the two polar nodes backs this experience. We have already explained this point.

Further, to justify the claim of the Siddhāntins that the upward and downward movement of the stars, their circular rotation and that they are spherical in shape, we have to assume a lot of things which are contradicted by a number of valid means like Perception etc. Then, how is it that humans and other living being that go on moving in different places according to their wish and capacity, do not feel the gravitational pull exerted by earth? It cannot be said that this pull of the earth cannot be felt because of the human effort, which acts as a preventing factor. By a small human effort, the great gravitational pull cannot be blocked. Even if it is presumed that the gravitational force cannot be felt by the sense-faculties as in the case of semi-celestial beings like Yakṣas, this pull is helpful to different beings in carrying out their respective activities. If this is the argument, the claim that the living beings are moving according to their own desire, cannot be maintained. Even granted that the mobile and immobile entities are both present in different areas of the earth, the claim that the celestial bodies which are present in one-fourth segment of the circumference have their heads crosswise and those celestial bodies present in the another

segment have their heads downwards and that this makes their mutual illumination, possible, is highly contradictory.

We should not say that there is no contradiction here when we accept that all the living beings existing on the surface of the earth do so, by clinging to the earth by their effort, as a support. Such an effort of clinging (holding) to the earth by their effort, which helps the humans who walk on the earth to keep themselves intact, is not known to us. In fact, such a phenomenon is found in ants and other living beings, which move underneath a piece of wood or a spherical object. Therefore the claims of Āryabhaṭa and others are extremely contradictory. If huge planets like the sun attract lighter planets like earth, the collision of the former with the latter becomes inevitable. So as to preclude this possibility, the Buddhists have accepted that earth is always moving upwards by its very nature without assuming any propelling agent.

We may argue that God alone is pushing the earth upwards. Then the corollary is that as in the act of pushing upwards God is capable of keeping earth and supporting it in a stable manner. In such a case, the orb of the sun, which attracts earth and other planets which in turn, attract the moon and other satellites, will be liable to go around still larger celestial bodies like the Saturn and the Jupiter, being pulled up and attracted by them. According to Astronomers, the diameter of the planets like Saturn and Jupiter is much larger than that of the sun. We cannot avoid the classification of the light and heavy bodies among the sun and stars, which are stationary. So there will be mutual attraction (pull) between each of the celestial bodies. Then the viewpoint that they are stationary gets contradicted. To avoid the fallacy of infinite regress, we have to accept some other body as extremely large. Then, such a thing can be posited with earth only. There is nothing wrong in accepting that the earth is stationary because depending upon the affinity and largeness of the bodies other than itself, the earth is able to rotate everything else. It is not possible to posit largeness etc. to celestial bodies, which are far off, and at greater altitudes, either with the help of telescope or the naked eye. Although the plurality of sun cannot be proved through any valid means from the viewpoint of different cosmic eggs still, there is no valid reason behind assuming several cosmic eggs in one and the same galaxy. Further, according to the principle of economy, although it is not accepted that the earth etc. do not have two different

movements, still we have to accept rotation of earth from a very long time due to some other factors or due to it own nature.

Such an understanding is necessary to account for the movement of ayanas (solstices), which are known through perception in relation to all stars other than planets and satellites. There is an analogy that the disease has not gone even after eating the 'forbidden' garlic. Let the theory of Pravaha (one of the seven powerful currents of wind believed to push various planets in the galaxy) be taken on this analogy.

Question: This kind of assumption is necessary when we take into consideration, the essential forms and characters of various objects in the world. Thus it may be a case of extreme cumbersomeness in presuming a series of things such as (1) the rotation of huge body of stars lying at a great distance, which cannot possibly take place in a short span of time of 60 ghaṭis (one ghaṭi= 24 minutes). (2) The movement of the sun in summer and winter solstices (3) Different kinds of movements associated with planets such as sun and satellites. (4) Heaviness etc. of the bodies, which is responsible for the falling down from planets, which are pushed by the wind called Pravaha, which alone is responsible for different kinds of rotation, mentioned above.

Statements made in the Purāṇas which run as follows are purely fanciful: There a huge jīva who has the entire universe as his body. So as to take care of all the small living beings contained in his body, i. e., to provide yoga and kṣema for them, this huge jīva, once in a day, gets filled up with all clusters of stars. He, then, will be known as Dyuloka. He shakes his head, as a result of which, all the clusters of stars, which are within his body, start rotating westwards. Then, as a result, the velocity generated by the rotation, all other stars including the planets and satellites will move in an eastern direction, depending upon their own inertness (jaḍatva). By this admission, it is accepted that no celestial body is capable of independent movement. Therefore, this argument has the greatest economy of thought. This huge jīva can shake his head even in a very short span of time. So on the analogy of small insects on the body of a human being moving or shaking, depending upon the physical activity of that being, the movement of planets can also be explained. As for the perception of earth being a small spherical object, it can be accounted for on the basis of the large distance, which acts as a deterrent, giving the impression that

earth is based upon two poles. This, of course, is perceptible as an error. Therefore, the view that earth is very small and that it is being rotated by the sun and other planets, is merely fanciful.

Question: "How to account for the perception of 4 to 7 moons within the orbit of Jupiter and Saturn appearing very close to them, as in the case of the moon which rotates close to the earth? This perception is however, caused by instruments. "

Answer: This question should not be raised. The axes of stars are very far off and so they appear very small in size. According to this impression, even though the stars are at a very high altitude, they are capable of moving, in a very limited way, around Jupiter and Saturn. Hence they appear to be like 4 moons etc. A man with sharp intellect can realize this point.

So, works on Astronomy are bound to be many and mutually different because they reflect the spatio-temporal phenomenon observed by people living in different parts of the world, having their own concept of the zodiac and celestial bodies. Various continents, which have a diameter of 64, 000 krośas constitute the vast earth. These differences are therefore bound to exist.

Accordingly, the Sūryasiddhānta and other texts are appropriate because they concern the present landmass called India. Thinking that these texts are applicable to the entire earth, a few modern astronomers are trying to refute the views stated in the Purānas. If there is any criterion in justifying their arguments, let the Siddhāntins do it. This is the remainder of the passage (verse 33). The author then replies in the following four verses beginning with "nanu" etc. This is a rejoinder too.

Question: If we accept the measurement of earth etc. as given in the Purānas as the governing rule, how can one have the awareness of day and night? How can they be equal always in the equatorial horizon? How can the days in the areas lying on both the sides of an equatorial region have an increase or decrease in daytime, for six months? How can the rise and setting of celestial bodies taking place in those areas be directly perceived?

Answer: The authors of the Purānas do not accept that the earth also forms part of the stars, that it is small and spherical in shape. So, the criterion of using the words ‘daytime’ etc. and the statement that there is sun in one part and the shadow of earth in another, can be accounted for.

A person mounted on an elephant etc. and coming, will not be visible in the beginning, but slowly as he comes closer (to the observer), he becomes clearly visible. Later on, as he moves away, he becomes invisible.

In the same way, the sun and other planes found on the apex of the rotating galaxy, first of all become objects of perception and later, approach areas, which are closer, again in the same manner, go upwards to the apex, appear in front and come lower and lower. They again become invisible because of the gap created by a portion of the earth marked by Meru (Terrestrial Pole). The time of their invisibility become Night and the time which facilitates their perception becomes the Day. The example to be cited here is Devadhānī etc. (Capital of gods). These celestial capitals exist in the eastern and other directions lying towards the north of the Mānasa Lake. This must be taken as an indicatory mark for all the cities existing in that portion of the earth because they have universal application over the entire earth (verse 37).

Nanu bhūmir viśālatve, dyuniśādivyavasthitih
Katham syād udayāstau ca grahāderiti cet śmu (34)
Merūpalaksya-bhūbhāga-vyavadhānāt ksapādikam
Dūratvadosāt bhūlagna-bhāveneksam-sambhavāt (35)
Grahatārodayāstādyam pratitya sambhavisyati
Devadhānipure Sūryo yadā madhyamgato bhavet (36)
Sarnyarninyam tadodeti hyevamādiprakāratah
Udayāstādikam sarvarn purāriesūpapāditam (37)
Atm Bhāratakhandetu drg-golādyanusāratah
Vyavadhāyaka-vaicitryāt dyuniśakramah (38)
Jāyate sa ca nirdistah samyak Siddhāntakartrbhih
Deśāntaracarākhyādisādhanaih ganitakramāt (39)
Atraiva Yamakotyādyā nagaryaścopavarmtāh
Hūnaih tāh apalapyante kvāpyadarśanahetutah (40)

Commentary: The authors of astronomical works have created a globe by combining the spatial expansion, zodiac and galaxy, which are accepted by people living in different countries in accordance with their perception, which is perverted. Because they wanted to demarcate daytime etc. that are not uniform in different parts of the world, they used their own calculations in preparing this globe. It has two halves - the upper and the lower. The joining of these hemispheres is called the Equator, which is circular.

The circle which joins two Poles and which touches the highest point is known as the Celestial Meridian. Likewise, the line touching East and West is called Samavṛtta (Prime Vertical). The area, which surrounds the region towards north of Meru up to a distance of 32 krośas is called Nirakṣa (Equatorial Horizon). This Meru is of course, presumed to exist in the Himasāgara (glaciers) and is marked by Pole stars. The area extending East to West for people living in that part, is called Viṣuva (Celestial Equator) in another area. That hemisphere, which seems to be hooked on either side by two Poles and which rotates, contains within itself, Aśvinī and other stars. They appear in their respective celestial latitudes (śara).

They are called ecliptic. The area lying between the planet forming part of this ecliptic and the Celestial Equator is called Krānti (Declination of Celestial body). On both sides of the Celestial Equator, within the respective declination of celestial bodies days and nights are conceived.

Writers on Astronomy have explained these concepts after their own calculations of the position of zodiac, galaxies etc. When the sun happens to be present underneath the Equatorial Horizon which is circular in shape, and outside the Equator, night takes place in the form of a shadow of earth marked by Meru which is presumed to be present. In the upper region of it, which lies in the amānta region when the sun happens to be present, we call it a day.
Days and nights will be longer or shorter depending upon the space and time available in different countries and in accordance with their Equatorial Horizon because these areas lie upwards or down-wards. Days and nights become equal in duration in the upper and lower regions from Equatorial Horizon, which is called Unmaṇḍala.

That is why in those regions nights and days will always of equal duration. The stars, planets and satellites lying in the colder regions of earth, marked by the Pole of Celestial Equator are seen to be moving like an umbrella in the upper region.

This is in accordance with the Purāṇic statement. That is why we explain that in those regions six months will be night and six months will be day. The rise and setting of planets also can be explained in the same manner depending upon the day and night phenomenon which takes place in countries depending upon their Equatorial Horizon. The Siddhānta writers have proved, with the help of instruments like Cara-khaṇḍa (mobile telescope?) that there are Cara-khaṇḍa times during nights coming within the region of the earth called Unmaṇḍala. But they have also referred to cities like Yamakoṭi and Laṅkā, like Devadhānī. However, any Westerner who has gone to even the most inaccessible areas in the Polar does not see them Regions. So, we have to presume that these cities have either submerged in the ocean or have obtained a different name.

Question: " If that be so, then, in the continent called America, which is concealed by the southern region of the earth, marked by glaciers, we have the concept of night (when it is daytime elsewhere). How can this be explained from the viewpoint of the region becoming a concealing factor where Meru is presumed to be present?

The Pole of the Celestial Equator, which appears to be in the north in the Continent of Asia, is actually south to those who live in the Continent of America. If both East and West are accepted to be one in both the Continents, the inference that day and night, are just reversed, will become contradicted. So the statement that Meru is in the North of all the countries will become controversial. "

Answer: This cannot be accepted. In the present landmass the glacier noticed as a special constellation appearing as the North Pole alone is the northernmost to everything else. Hence, the eastern and western directions demarcate countries, which are indicated from the phenomenon of sunrise etc.. So the direction where the sun rises is called the East. From the viewpoint of this eastern direction, what is known as north consists of both the Continents mentioned above. Northern direction is still only one because east and west are two

different directions and the reversal of day and night in these regions can be satisfactorily explained. The statement quoted above is universal in application, governing the entire landmass. So, there is nothing wrong even if the above rule is not applicable to the present landmass demarcated by directions like north etc. Therefore, the word Meru is taken either in a secondary or primary sense. The statement made above, can be applied to the present landmass. This fact can be easily understood by those who are aware of the Map of the Earth (verse 40). The author then states in the following 18 verses the method in which the digit of the moon waxes and wanes, in response to those who think that eclipses do not take place as mentioned in the Purāṇas. Even granting that the rise and setting of planets and the classification of day and night are clearly established, this position is not opposed to the views of the Siddhāntins.

Nanu Paurānike vāde Puspavadgrahanam katham
Sūryādhisthita-jyotiścakrasya cakravad bhramah (41)
Bhūmandalāduparyeva tair añglkriyate yatah
Ato na sambhvatyeva bhūcchāyācchādikā Vidhoh (42)
Evam Sūryasya candro 'pi chādako nordhvago yatah
Tatah Saiddhāntiko vādo yuka eveti cet śrnu (43)
Simhikātanayo Rāhuh grahatvam prāpya tāmasah
Naksatramandalordhvādho divam ākramya vartate (44)
Mukhena so 'rkam ācchādya candram tulyena māntah
Krsnena dūragenāpi darśe drśyah kadācana (45)
Pūrnimānte tu pīyūsakaram nijakabandhatah
Tatkaksāsamsthitenaiva dhūmrakrsnādhikātmanā (46)
Samślisya drśyate sarvaih prakāśāśrayatah khalah
Adhomukhah samavyastagatih candrārkamatsarī (47)
Siddhānte yā vidhoh kaksā tanmukhasyaiva so 'rdhatā
Vijñeyā Candrakaksā tu Purānoktaiva vāstavī (48)
Sā bhavet tat-śarīrasya kaksā tasmād ravīndugam
Uparāgadvyam yuktaih api paurānike mate (49)
Gananārītito 'pyetad yuktarh tatrāta eva hi
Sūryagrāhakarāvāsye candratākalpanād raveh (50)
Adhahkalpitacandrīyakaksāyām pātayor dvayam
Rāhuślrsasthānatayā matarh Siddhāntavādibhih (51)
Tatra Rāhuśirasspastacandratulyam hi jāyate
Atah Saiddhāntikaih glāvah Sūryācchādakatā matā (52)

Candragrahe ca bhūcchāyā nivartyā jyotsnayāpi ca
Chādikā kalpitā tasyā upapattyartham ucyate (53)
Jyotiścakrāntare bhūmih nirādhārā vrthā tathā
Purānoktārkacandrādi-kaksākramaviparyayah (54)
Bhrantirūpāparoksottha-tarkamūlo 'bhimanyate
Abjatvād ammaye candre bimbante sūryaraśmayah (55)
Candrikotpadyate tena kalānām vrddhyapaksayau
Api lokaih pratlyete ityapi vyartamucyate (56)
Yatastatāmrtam devabhogyarh sañclyate 'bdhitah
Sauratāpavaśāt nityarii Candrikātvamrtaprabhā (57)
Ityāgamādisiddho 'rthah āstikaih durapahnavah
Vyavahārtha-kalpyena vastvarthānām abādhanāt (58)

The word "puspavantau" means the Sun and the Moon. Their eclipses mean appearance which has become darker at the end of the Parvan (fortnight). Since the earth is not accepted as forming part of the constellation of stars, the question of its shadow concealing the moon does not arise. But the moon is admitted to be present above the earth. So the moon cannot be a hindrance to the sun. According to the theory of astronomers, it is common knowledge that every night the shadow of earth appears to be long and as crossing the orbit of the moon. It appears to be moving along with the sun. The orbit of the moon rotating by its own force, will be illuminated partially by the rays of the sun and enters the shadow of the earth.

Then people think that the moon is swallowed by a dark body, which is by nature, not in contact with the rays of the sun. In the same way, the moon having such an appearance also, in the period culminating in the dark fortnight sometimes separates the Sun. He appears to be eclipsed to the extent to which he is concealed by the moon. This accounts for the view that the moon is at a lower altitude than the sun and that the earth is rotating all along. Then the question is: Are all the views of the Siddhāntins valid or not from the viewpoint of mathematicians?

The reply to this question is given by the words "Simhikā" etc. (44a) Here the story narrated in the Purāṇas is suggested. According to this, a particular demon by name Rāhu was desirous of drinking nectar but he was killed by the Dicus of Viṣṇu. The head portion became immortal because it tasted the nectar; then he

had been elevated to the heavenly region, which consists of various constellation of stars.

His trunk, which is alive, lies in the upper half of the constellation of stars whereas his crown, which is also alive, remains in the lower half. His face is said to be similar to the moon; this is only from the general viewpoint of the Siddhāntins, and also from the viewpoint of its movement. But it is not a fact. Because of the different statements made in the Purānas regarding the size of those two halves of Rāhu's body. The extent of the moon is said to be 12, 000 (krośas) whereas that of Rāhu is given as 13, 000 (krośas).
The adjectives employed are: kṛṣṇena dūrageṇa (v. 45).

Paścād bhāgād jaladavad adhah samsthito 'bhyetya candro
Bhānorbimbam sphuradasitayā chādayatyātmamūrtyā
Paścātsparśo haridiśi tato muktirasyāta eva
Kvāpi cchannah kvacidapihito naisa kaksāntaratvāt
Samkalakāle bhūbhālagatimrgārike yatastayā mlānam
Sarve paśyanti samam samakaksatvāt na lambanāvanatī
Pūrvābhimukho gacchan kucchāyāntah śaśī viśati

This explains the view of the astronomers that eclipse takes place in the front part. The element, which conceals the sun and the moon, is different because of the difference in the direction, area and the time of the eclipse. That which conceals the sun is small in size, distant, confined to a lower region and fast in its movement whereas that which covers the moon is huge in size, taking place in the same orbit and is equal to the sun in speed. All these are matters of direct perception, etc. But those two concealing elements rule over the other planets like the sun and the moon; they are composed of a special kind of rocky material; they do not have any quantity of water in them; they do not have any contact (reflection) of the sun's rays. For the same reason, they sometimes appear in different colours like grey, black and tawny. They are therefore two specific bodies, which are black in colour.

Astronomers admit that bodies like moon, which are circular in shape, appear bright because of their reflection of the sun's rays in water that is deposited in their rear portion. That is why it is imagined that the black spot, which is seen in the moon, is nothing but a portion of the land, which is dry and lofty. Let Rāhu

be the only planet which resembles the moon when close to it, etc., which presides over them with the two live halves; they have been referred to earlier as two black bodies. This has been proved on the basis of several scriptures and also supported by the perception of all people during eclipses.

The Siddhāntins have to presume that the moon as well as the shadow of the earth which are already accepted by them as the blocking elements; this is done by them because they believe that earth etc. are small and spherical in shape, without any support. As a matter of fact, these two spherical bodies, which move around the sun and the moon, cannot be seen without the proximity of light. This cannot be denied.

That is why, the experience of people that during the total eclipse of the moon, it has different colours like white, red and tawny. Otherwise, if it is completely covered by a shadow, it should appear in its own natural black colour. That is why the expression, "sama-vyasta-gatiḥ" (47), as applicable to Rāhu should be interpreted as having two types of movements "sama" and "vyasta" in the following manner: The movement of this planet (Rāhu) is similar to that of the sun and the moon which are delimited by the two parts of its body, viz., crown and trunk. It becomes reversed (vyasta) when the crown and trunk are taken separately. Then the movement will take place in the eastern direction.

Objection: If the crown and trunk have two different movements, then the eclipse will not take place in a specific time fixed for its occurrence.

Answer: This is quite acceptable to us because the ecliptic and non-ecliptic overlapping, which are presumed to arrive at the celestial latitudes fall within the fixed six-fold zodiac (each consisting of two rāśis). This is quite well known. During solar eclipse, the head of Rāhu (ascending node of the moon) is a dark sphere which sits at the top of that node. The particle "hi" (v. 52a) means, "for that reason". The expression "spaṣṭa-candra-tulyaṁ" means this: The moon will be clearly seen from the area of the ecliptic which is marked by its association with the asterism called Revatī. It means a part of the Rāśi (zodiacal constellation) extending up to the ecliptic, which is delimited by the range of observer's vision of the orb of the moon. The node of the moon becomes similar to it because they both belong to the same zodiac, appearing in the same kalpa.

That is why, the Siddhāntins who do not accept that the two spheres mentioned before, make the following statement: They superimpose “moonhood” (candratva) on the dark sphere which sits on the crown portion of Rāhu, which has the same movement as the moon and which appears to be blocking the sun. Then they admit that the moon lies beneath the sun in the vicinity of earth itself. They also presume that the dark sphere which is occupied by the trunk portion of Rāhu whose movement is equal to that of the Sun and which appears to be eclipsing the moon, is nothing but the shadow of the earth. Accordingly, they presume that the moon is not self-luminous and that the earth is small and spherical in size and that it has no support. Otherwise, the concept of shadow of the earth touching the orb of the moon cannot be explained.

By this assumption, we are not contradicting what the Purāṇas have stated. Even if they be true, there is nothing wrong in presuming certain factors, which are helpful for the present theory, although it may be contradictory in spirit.
This can be justified on the analogy of the Smṛti-statement: “A Brahmin should be invested with the sacred thread in his eighth year. ” This statement appears to be contradicted by the scripture which declares that jīva is eternal. This declaration of the law text cannot on this ground, be taken as invalid. It merely restates the fact that the boy is eight years old. It does not have the purport of conveying the contradictory idea.

In the same manner, the Siddhānta texts proceed on certain assumptions and thus, on that ground, they cannot be taken as ultimately valid. Still their validity at the empirical level cannot be denied. This point has already been explained. The word “vṛthā” (in vain) (verse 54a) becomes supplementary to the expression “vyartham ucyate” (verse 56b). We have to supply the word “vastutah” (as a matter of fact), to make the sense complete. So it is clear by this expression that both the views can be justified by taking their ultimate purport or import into consideration. This rule applies to the Siddhāntas as we are going to demonstrate shortly.

By this we have to understand that total eclipse will not take place because Rāhu will not be similar to the orb of the moon because the size of Rāhu will be smaller. These ideas have been implied by some passages already mentioned. Even if similarity is posited somehow or other, between Rāhu and the moon in terms of their size the duration of eclipse will be extremely great. This is an

unwanted contingency. Further, under such a consideration the commencement of eclipse and its end will take place in different directions. If a difference is accepted between the factors causing the eclipse, there will be contradiction in the Purāṇa and other statements. Another contingency is that there will be an eternal eclipse. All this is inconsistent prattle of some modern astronomers. All this is rejected by our present interpretation.

We have accepted some of the views of the Siddhāntins over and above our own considered opinion such as: (a) The trunk of Rāhu is spherical in shape which moves before the Sun moves and that it covers the Moon and also that it is nothing but the brightness of earth; (b) The crown portion
of Rāhu is spherical in shape and that it covers the Sun and also that it moves before the moon, which crown portion is also accepted as the Moon itself.

Question: On what grounds is all these accepted by you?

Answer: According to the means of knowledge known as Anyathānupapatti (otherwise it becomes unaccounted for). This is the most powerful of all means of knowledge. So it has been stated by the wise:

Anyathānupattiśced astu vastu prasādhikā
Pinasti drsti-vaimatyam saiva yasmād balādhikā

(If Anyathānupapatti is capable of proving things then, that itself will remove all controversies in the perception (viewpoints). This is so because it is more powerful (than any other means of knowledge).

The opponent asserts further: “The nectar which is always accumulating in the orb of the moon which is full of water, and which comes out from the salty ocean because of the sun’s rays, shines forth (appears) in the direction of the sun. Although this nectar is drinkable like any other liquid, it lacks in the bright whiteness (as in the case of water), which illuminates other things. ” All this is incoherent talk.

We also admit that the sun’s rays form the cooperative cause in giving rise to moonlight. The one who prattles like this is denying to himself birth a Brahmin community. He follows those who live in foreign lands where people are

capable of inventing some new machines like the windmill. Such a person should not even be mentioned by name by those who follow the Vedic tradition. So, enough of this refutation of the so-called astronomers (verse 58).

The author gives five verses, which spell out the orderly formation of various orbits accepted by the Purāṇas and Siddhāntas. This is in anticipation of the objection that may be raised by the opponents. They are as follows: (1) The moon must be accepted as existing at a plane lower than the sun (2) Otherwise, the moon which always rotates around the earth from close quarters must be accepted as going around the sun along with the earth. (3) The moon ha a faster rate of movement compared to the sun. (4) Its orbit therefore is larger but then the movement must be slower and limited. But direct perception reveals that it has a faster rate of movement:

Nanu arkādadha evādho gatibāhulyadarśanāt
Yatra ūrdhvordhvasamsthasya kaksā prthvīgatir laghuh (59)
Yukteti cet na khetānām sāmyaśīghratvamandatah
Sva-sva-jādyādi-vaisamyād upapadyanta eva hi (60)
Nacaivam satyanugamo ganitena gatah katham
Iti vācyam yatah pūrvaih tattat ksetrasya vedhatah (61)
Bhaganākramane kālam jñātvā trairāśikādinā
Gatir viniścitaivātah Purānokto grahakramah (62)
Jñeya ūrdhvādharībhāve vāstavo 'tra kukhandake
Prātītikastu Siddhānta-prokta Ityavagamyate (63)

It has already been pointed out that the cosmic Jīva shakes his head and that due to the speed of that shaking, various planets come out and move in their respective orbits. On this assumption, even though the planets are of equal size still, depending upon the differences in terms of their inertness and heaviness, there will be the waxing and waning of the digits of the moon, which exists at a plane, higher than the sun. Although the moon is larger than the sun, it does not have such a heaviness compared to other planets. So is rotation is more than that of other planets.

The difference in the orbits is responsible for the difference in their movements. If this is accepted, then even the movement of the apex of the slowest motion must be admitted to have a faster movement. It should not be doubted that the

movement of the planes explained in this manner is inconsistent with the view adopted by astronomers.

Ancients with the help of degrees in the moon and such other method, found out the time taken by a heavenly body for its daily rotation. They could arrive at this with (out?) globe and other instruments. They adopted the following methodology for these calculations: If a celestial body takes this much time for its revolution in a day, then, how much time would it take for the daily motion in a civil day? Again how much time it would take for the daily rotation at the commencement of a Kalpa and a Yuga? They calculated this on the basis of the Rule of the Three (Trairāśi). This is quite well known from the Middle Section (Madhyama Adhikāra), The movement of the planets understood from the calculation of the zenith distance in different areas and times is again proved in the 8th section of this work. This has been accomplished on the basis of the two types of Zenith distances arrived at on the basis of the Equation of Conjunction and the Equation of the centre.

The adorable Sage Vyāsa also, in the first part of his Siddhānta text, accepted the view of Saura and other texts, with slight modifications. These texts follow the general perception of people living on the present landmass called the Earth. Vyāsa has made this opinion clear after restating the views on Earth given in the Purāṇas.

It is quite evident that the view held by the great sage cannot be wrong because it has their support of yogic perception. The views expressed in the Siddhānta texts are based upon certain calculations concerning all planets, which are at different distances and at different altitudes. The orbits of these planets, however, appear to be very close, of large expanses and as having upward and downward rotations.

It should not be doubted that the order of the days in a week starting with the Sun (Sunday) will be incoherent because of the Siddhānta texts where the orbits are given in an unrealistic way. According to them, starting from Saturn, the lords of the days will be four in order (Saturn, Venus, Jupiter and Mercury. The order of the days of the week is being followed from time immemorial and it is purely conventional.

There is nothing wrong even if the order of the orbits is followed. As stated in the Saura Siddhānta, the lords of the days will be five in number, starting from the Moon upwards (Monday to Friday). But even this view is based upon the conventional understanding of the order in which the orbits are formed.
So the viewpoint held by the Purānas and Siddhānta texts are based upon the ultimate and conventional means of knowledge, respectively. This is quite reasonable.

Question: How come you are so fanatically attached to the Purānas?

Answer: The Purānas had been composed by great sages and then the same is the position with the Siddhānta texts also. So, to account for the appropriateness of both these traditions, we have to come to such an understanding. Otherwise, how can there be any propriety in the views stated by the Siddhāntas if they are mere assumptions?

Question: How can even the four-faced Brahmā lend validity to certain means of knowledge which prove certain possible and contradictory views? Then you have to accept necessarily that only either of these should be wrong. The Purāṇic statements alone can be brought under this category since they are merely laudatory passages (arthavādas). The injunction (vidhi) to which they are subsidiary, is: “Contemplate on the Supreme Lord Who has the entire earth and other such products (kārya) as His body,. ” This is a reasonable proposition. On the other hand, the views expressed in the Siddhānta texts are in tune with other means of knowledge like Perception. Perception is more powerful than other means.

Answer: (1) This cannot be accepted. We have already given the reason as to why we have such a strong attachment to the Purānas. The impression of various people living in different parts of the world like our earth, must all be on the same line. There are bound to be innumerable landmasses having huge circumference of 5000 yojanas. (2) The Siddhānta texts have the intention of conveying facts about our planet earth in terms of the time, space, directions, etc., in a systematic way, as Grammar and other sciences. Grammar for example has the sole purpose of conveying the meaning of words formed by adding suffixes, augments, etc. to roots or stems. So their validity cannot be questioned.

We have already pointed out the way in which both these traditions can be valid. Sublating one of these two traditions is therefore unjustified. Although the laudatory passages are subservient to injunctions, there is no propriety in sacrificing their own connotation, where there is no reason for undermining their import.

Further, if the foreigners, starting with the premise that the sun which is stationary, go round the area marked by the glacier which is at the Pole, cross the salty ocean which is near the Indian continent with great difficulty and move towards east or west, then they would have known whether there is another Pole or not, and also if there is another zenith distance known to the people of another continent.

Accordingly, if they cross the entire salty ocean by traversing under he \Pole noticed towards the south of the continent of America, they would have known whether is the mountain of snow (Himālaya) mentioned in the Purānas actually exists or not. Nobody can travel so. It has to be admitted that in the continent of Asia, in the region, which lies 40 Degrees latitude, there are places like Badarī and Kedār(nāth). People know about their existence. These places are present there at the foot of the Himālayas, marked off from each other. Otherwise, this fact cannot be explained. Hence the statements of foreigners that there are a number of mountains in the Himalayan ranges holds good. Parts of this mountainous range are referred to by people by different names. This is a fact, which cannot be denied. Going, without the polar direction, to regions on the earth itself, which lie towards the east, west and north of the rocky and uneven mountainous terrain corroded by the salty waters covered by heavy snow, is virtually impossible.

In the same manner, in the Continent of Asia also, going to inaccessible regions covered by salty oceans below the South Pole is also not possible. Hence it is not possible to decide whether there is any entry into the Continent of America; whether there is South Pole which is visible and which is different from the Zenith Distance; or whether there is in the South, a huge salty ocean as stated in the Purānas.

So, surrounding the present landmass called Earth in all the four directions, there is a huge salty ocean, which of course, is not in accordance with the

knowledge of Poles. Nobody can reach that place. Only a portion of what the Purānas have described as a very huge landmass is known to us. This cannot be disputed. Our ancestors and the modernists living in Hindustan, have disputed the existence of areas like America and Europe which are seen and inhabited by foreigners. But these areas have not become non-existent on that account. Likewise, things not known by direct perception or known only scriptures such as the very huge landmass called Earth (different from what is known to us), position of Meru at its centre, or the presence of heaven etc., are disputed by our modern astronomers since they are unable to identify or reach them. Even if such things are disputed logically, they do not become non-existent. And those who try to deny such phenomena, will turn out to be Cārvākas (Materialists). (You may argue as follows): We are not denying the existence of Meru etc. We admit that they are present in the limited landmass called Earth; we also admit that heaven etc. are present in the space. So we cannot be charged as belonging to the school of Materialists. We only wish to state that foreigners who have been travelling and exploring the present continent which is described by astronomers as small in extent, could not find Meru etc., anywhere. So, on the authority of scriptures only it is but proper to accept a huge landmass (different from what we know) as existing somewhere, even as we accept heaven etc., although they are not visible to the naked eye.

(You may further argue as follows) We do not accept that there is a very huge landmass as describe in scriptures because of the unaccountability of the upward and downward rotation of earth whose shape is taken to be spherical or like a basket on the ground that it also forms one of the constellation of stars. In so far as the existence of heaven etc. in the space is concerned, there is such a controversy or inconsistency.

(We reply) Although the infinite mass of constellations keeps moving above the infinite earth like an umbrella, the view that it moves up and down is vitiated by defects because it takes place at a very high altitude. We have already substantiated this point.

Otherwise we have to admit by force that it is very small in size and that it rotates in close proximity and the like. The works (Purāṇas) cannot but be accepted as valid means of knowledge because they were composed by Vyāsa and others. Their works cannot be called in question like the vernacular

compositions of some modern scholars. The scriptures (Vedas) are eternal with no beginning, like a stream of river, which keeps flowing all the time. Vyāsa and others have merely restated the truths contained in scriptures (Vedas). They are composed by the Omniscient Lord Himself, who is free from all kinds of defects. So their validity becomes primary. Other means of knowledge like Perception also become valid only in so far as they are in agreement with the scriptures. So, even in the case of perception, its validity becomes independent only when it is properly tested. Perceptions, which are defective, cannot be taken as valid (verse 63).

Now the author concludes the work, which he has embarked upon in the beginning. He gives six verses, beginning with tasmāt. His main thesis is that with such an understanding we can accept the views expressed in the Purānas as well as the Siddhānta texts like the Saura, regarding the planet Earth etc. Their statements should be taken as having different imports:

Tamāt tātparyabhedena yuktameva matadvayam
Paurānikānārh tātparyam Iśvaraiśvaryabodhane (64)
Itthamīśakrtasyānt bhūmyāder nāstyathāpi tu
Uktarūpena niścitya taddhetāvlśvare manah (65)
Upāsanādinā svestasiddhyartharh kriyatāmiti
Siddhāntakāratātparyam Bhūkhande tvatra Bhārate (66)
Grahādicārabodhena deśakālādibuddhaye
Astvalpamānam bhūmyādiyuktyā pratyaksamūlayā (67)
Naitāvatā Purānokta-tatvabādho bhavediti
Parilekhādi at Mlecchaih krtarh tadapi yujyate (68)
Catuskhande ‘ tra Bhūkhande Siddhāntārthānusāratah
Pratyaksayuktivaśatah athānirnayasambhavāt (69)

Commentary: It is true that mathematical calculations make us understand the place, time etc. of planets (in God’s creation). Wise men will be able to understand them as given in the Purānas in a very easy manner. These Purānas describe the glories of the great Lord (in this way). The Siddhāntins have taken great pains in calculating several factors to make people of ordinary intellect to understand them in a very clear manner. We should not thereby say that the simple calculations of earth etc. given in the Purāṇas as applicable to the present continent of ours, are not useful at all. Even writers like Bhāskarācārya,

in their works like the Siddhānta-śiromaṇi, anticipated and restated the criticisms which will be voiced by modern mathematicians or astronomers. That view has been explained by a very modern scholar in his commentary on the 15th verse of the text śiromaṇi. This commentary bears the great name śiromaṇiprakāśa.

Foreigners, following the views of Āryabhaṭa, a Jain, described the Earth etc. by adding a few features obtained through direct observation. If they have denied the existence of Meru on the earth, that is quite understandable because places like Meru and Laṅkā (place on the Earth's Equator through which the Prime Meridian passes), are not present in the present landmass called Earth, which is divided into four continents.

As for the view that the circumference of earth extending from South to North is smaller compared to the circumference measured East to West, is also proper. Here is the explanation: Let one find the difference in time in sunrise in a single day, in two cities, one located in the East and another in the West (with reference to longitudes), with the help of an instrument. If during this time gap, the difference in distance between these two cities extends to so many krośas, then, what will be the measure arrived at through the Equinox, proved by the Rule of Three (trairāśika) if the difference in the time of sunrise is equal to 60 ghaṭīs?

Then the result will be close to 20, 000 krośas. In the same way, if the difference in sunrise in two cities located in South and North is calculated with the help of the Rule of the Three (trairāśika) using terrestrial latitudes, then it will be closer to 13,000 krośas. This is so because the diameter of the circle drawn with the Equinox, when doubled, will be of that measure.

Further, there is simplicity in assuming the rotation etc. for earth compared to the concept of Pravaha. All these are acceptable when we take into consideration the nature of objects, which are practically known and also arrived at through experiments. But we have to understand that considering all the stars, which are stationary in relation to earth as so many suns, is merely fanciful (verse 69). Likewise, several statements made regarding the earth etc. made in the Purāṇas as facts should not be rejected outright on the ground that they could not be practically verified. On the other hand, we have to just ignore

them. A new work, called the Virodhamardana has been composed only to highlight this point. Wise men should examine this, free from the feeling of jealousy. The author now concludes this work with this prayer, with two verses:

Purānādyavirodhasya spastikārārthamādarāt
Yajñeśvarena daivajñkulajātena yah krtah (70)
Virodhamardanākhyo 'yam granthah śodhyo budhaih mudā
Vicāryotsārya mātsarya āryādimatakovidaih (71)

This prayer is made with an open mind, free from all inhibitions and fanaticism. It is addressed only to atheists in the main, but not to others who are even ignorant (people of limited knowledge). Any prayer or hour shown to people puffed with arrogance due to very limited knowledge, will be a waste. Śivam! (Auspiciousness!)

Commentator's remarks: (The author himself is the commentator)
I have composed commentary on my own work in a very brief and clear manner so that the so-called self-styled astronomers may not find flaws in it due to wrong interpretations based upon their sheer ignorance and confusion. The wise ones should understand that I have removed all such defects in the course of my commentary.

The Astronomer Yajñeśvara, son of Sri Sakala Sāmvatsarārya Jyotirvit Sadāśiva, composed the Commentary on Virodhamardana.

[Translator's Note: The manuscript gives the name of the scribe as Bāpu Nāmadeva. The owner of manuscript is Joṣirāva Rāvajiyā.

NOTE: The commentator has given the date of composition using numerical codes, as Saka era, 1762 (=1830 A. D.)]

Endnotes:

[1] According to Nyāya, non-existence (abhāva) is fourfold: Prāgabhāva (anterior non-existence), Pradhvarhsābhāva (posterior non-existence), Anyonyābhāva (mutual non-existence) and Atyantābhāva (absolute non-existence).

[2] When we say that there is the non-existence of a pot (ghaṭābhāva), the pot is said to be the counter-correlative of its non-existence. Since the world itself does not exist in the real sense according to the Advaitins, the question of its counter-correlative does not rise at all.

[3] According to this, an effect is pre-existent in the cause itself.