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The e-journal, **vEda vaaNee**, is open to all bona fide scholars in Vedas, Vedangas, Vedantic, Sanskrit and other allied subjects of Sanatana Dharma. The journal is intended to publish articles, reviews, and news including conferences, details, proceedings, meetings, PhD projects of students etc. We may consider a column of answers to comments on articles published in the journal, with final comment by the author. The present journal is a platform where scholars from different disciplines can examine and explore the inter-related nature of the disciplines of Vedas and Sanatana Dharma using a holistic approach.

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Editorial Page ----

The Veda Samskruti Samiti (VSS), Hyderabad is pleased to inform its readers that the International Standard Serial Number (ISSN) for the *vEda vaaNee journal* is approved by the ISSN National Centre India, National Science Library, New Delhi and the number is **ISSN 2583-9020** on August 20, 2023. This landmark achievement is accomplished in less than four months' time! The VSS has initiated the application process on the *Shankara Jayanti Mahōtsavam* day, the 25th April 2023. The ISSN is the unique identification of a journal. An ISSN is eight digits long and is displayed as mentioned above. The ISSN should be as basic part of a journal as the title. The advantages of using it are abundant and the more the number is used the more benefits will accrue. It results in accurate citing of journals by scholars, researchers, abstracters, and librarians. As a standard numeric identification code, the ISSN is eminently suitable for computer use in fulfilling the need for file update and linkage, retrieval, and transmittal of data. The ISSN is used in libraries for identifying titles, ordering and checking in, and claiming journals. It simplifies inter-library loan systems and union catalog reporting and listing.

We are now in the process of publishing the **Vol. 1, issue 3, October 2023** on time. In this issue it is planned to publish five research articles in the Section - 1. They are: (i) Botanical Facets of *Bṛhat Saṃhita* - Varāhamihira's *Magnum Opus*, (ii) Nature and its Cyclic Path, (iii) Cultivation Techniques in Vedic Sciences, (iv) Relevance of Astrology in Ayurveda and (v) Volume of Solids - *Khātavyavahāra* in Sanskrit Texts. In the Section - 2 (i) News review of Jagadguru Sri Adi Sankaracharya Peethams, (ii) OM vs. AUM – Which is Correct? (iii) Ashtadasha Shakti Peethams and (iv) Grantha Sameeksha of a Veda book are considered for publication.

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Section One
Research Articles



Botanical Facets of *Br̥hat Saṃhita* - Varāhamihira's *Magnum Opus*

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Abstract

Varāhamihira's most famous work was *Br̥hat Saṃhita*. It is an encyclopedic work on architecture, temples, planetary motions and many other topics. The *Br̥hat Saṃhita* described various morphologic and physiologic features of vegetation as hydrologic indicators to locate sources of ground water at different depths. Hence, the *Br̥hat Saṃhita* establishes Varāhamihira as the first hydrologist who codified all the then existing knowledge on the subject in his magnum opus. Altogether, there are more than 545 herbs, shrubs, trees and crops that were mentioned in the two parts of *Br̥hat Saṃhita*. The *vr̥kṣāyurveda* chapter deals with treatment of plant diseases and prescriptions of remedies, nutritional and other aspects of plant life. The plants that are revealed in the *Br̥hat Saṃhita* can be classified into huge trees, edible fruit trees, shrubs, herbs, creepers, water plants, grasses, pulses, cereals, wild cereals and others, as per the Bentham and Hooker taxonomic system of plant classification. Till date, there is no systematic study on the flora or botany of this historical work on *Br̥hat Saṃhita*. Therefore, a systematic floristic study and the uses of these plants/trees are comprehensively discussed in this review article.

Key words: *Varāhamihira, Br̥hat Saṃhita, plants, flora, plant indicators, floristic analysis*

Introduction

Trees and forests augment manifold the beauty of the earth. They are the very basis of human life and the biosphere. Plants are one of Earth's greatest resources. They are sources of food, medicines and materials with vast economic and cultural importance. In the four Vedas, there are many herbs, vines, shrubs and tree species are described [4]. Following the Vedic texts and tradition, several ancient epics to till recent Sanskrit texts described various plants and trees that are useful for humanity.

One such Sanskrit text that was the most valuable contribution to the scientific world is the *Br̥hat Saṃhita* by Varāhamihira.

The *Br̥hat Saṃhita* deals with a wide range of subjects of human interest, such as astrology, planetary movements, eclipses, rainfall, clouds, architecture, growth of crops, manufacture of perfume, matrimony, domestic relations, gems, pearls, and rituals [3, 5, 7]. Each of these subjects has been treated, keeping in view its significance as an augury or its astrological effects [15].

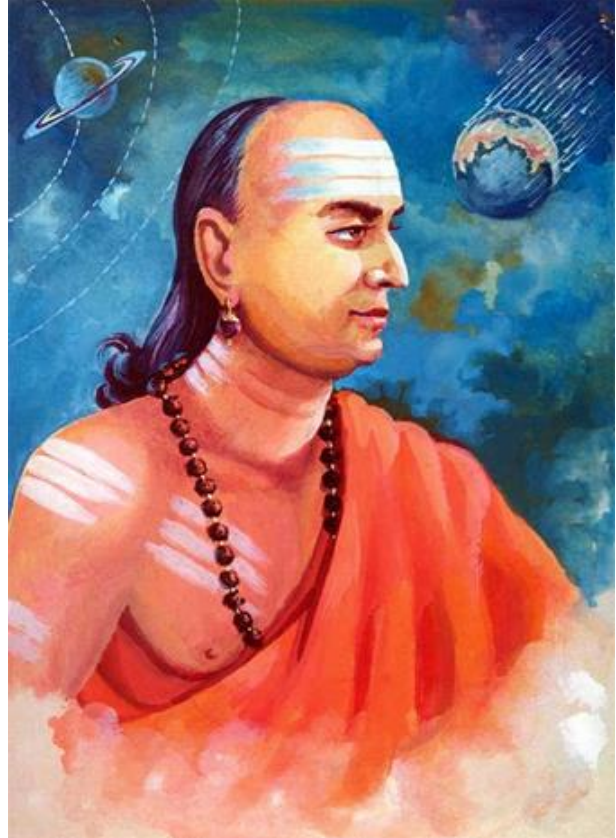
Varāhamihira and his Monumental Works

Acharya Varāhamihira, son of Ādityadāsa, also called Varāha or Mihira, born in the year 505 in Avanti, Ujjain, Madhya Pradesh, India and died in 587. According to one of his own works, he was educated at Kapitthaka [17, 18, 12]. He was an Indian

philosopher, astronomer, mathematician and editor of the *Pancha-siddhantika* (Five Treatises, as we know it), a compendium of Greek, Egyptian, Roman, and Indian astronomy [3, 7].

Varāhamihira studied *Jyotiṣa* (astrology) from his father, Ādityadāsa. Both father and son were worshippers of Sun God. Āryabhata, the celebrated astronomer was older than Varāhamihira but the two met frequently at Kusumapura in Magadhadesa. Varahamihira's knowledge of Western astronomy was thorough. An intellectual with a broad outlook, Varāhamihira who respected learning wherever it was found, was intimately acquainted with the astrological literature of the Greeks to which he makes a reference in his works, but he was not a blind follower of old ideas. The outstanding works of Varāhamihira are - (1) *Panchasiddhantika*, (2) *Vivahapatala*, (3) *Brhājātaka*, (4) *Laghujātaka*, (5) *Yātra* and (6) *Brhat Samhita* possibly written in that order. The *Panchasiddhantika* is a summarization of five *siddhāntic* texts that were known to Varāhamihira. These are, (1) *Saura Siddhāntika*, (2) *Pauliśa Siddhāntika*, (3) *Romaka Siddhāntika*, (4) *Vaśiṣṭha Siddhāntika* and (5) *Paitāmaha Siddhāntika* [3, 5].

Varāhamihira belongs to the galaxy of Indian scientists that include Dhanvantari, Caraka, Śuśruta, Āryabhata and Bhāskarācharya whose fields of specialization ranged from medicine and surgery to mathematics. In the long history of *Bharatiya Jyotiṣa* (Indian Astrology), Varāhamihira stands supreme as a versatile personality. His greatest work, *Brhat Samhita*, deals with an astonishing variety of subjects of exceptional interest and value. Al Biruni, the Arabian



astronomer who translated the *Laghujātaka* of Varāhamihira into Arabic, eulogizes the *Brhat Samhita* for its richness in details [2]. Astronomy, architecture, sculpture, medicine, psychology, physiology, botany, zoology, groundwater and other subjects are treated in a masterly fashion and the language and style used prove Varāhamihira to be a poet of high order in Sanskrit. He had a great admiration for Kālidāsa. A later tradition includes them among the nine jewels of Vikramāditya's court, but their contemporaneity has been disproved [14].

Varāhamihira's chief work, *Brhat Samhita*, deals with an astonishing variety of subjects of exceptional interest and value. Al Biruni, the Arabian astronomer who translated the *Laghujātaka* of Varāhamihira into Arabic, eulogizes the *Brhat Samhita* for its richness in details. Astronomy, architecture, sculpture, medicine, psychology, physiology, botany,

zoology, groundwater and other subjects are treated in a masterly fashion and the language and style used prove Varāhamihira to be a poet of high order in Sanskrit. He had a great admiration for Kālidāsa. A later tradition includes them among the nine jewels of Vikramāditya's court, but their contemporaneity has been disproved [14].

Previous works on *Bṛhat Saṃhita*

A perusal of literature survey indicates that majority of published information of *Bṛhat Saṃhitā* is on the *Jyotiṣa* and astronomy. Iyer (1984) published the *Bṛhat Saṃhita* in two volumes with English translation. Bhaṭṭoṭpala [3] made a commentary for all ślokas of *Bṛhat Saṃhita* in Sanskrit language. Seal [16] published information on chapter 54 of *Bṛhat Saṃhita* with English translation of the Sanskrit ślokas of Varāhamihira. Majumdar [10] published a book on *Vanaspati* wherein he brought out some rudimentary information on the chapter 54 of *Bṛhat Saṃhita*. Sastri and Bhat [15] brought a book on *Bṛhat Saṃhita* with English translation and notes. Shastri [17] published a book on *Bṛhat Saṃhita*. Prasad [13] published a research article on plant indicators of *Bṛhat Saṃhita* of chapter 54. Sarma [14] published a book on Varāhamihira. Murthy [11] published an article on Varāhamihira, the earliest hydrologist with information on plants of chapter 54. Bhat [2] brought a two voluminous book on English translated *Bṛhat Saṃhita*. Vanadeep *et al.*, [20] studied 27 meteorological predictions and were compared with the on-site real-time recorded values of meteorological parameters like rainfall, wind velocity, wind direction, cloud direction, etc. over four Indian regions. Joshi *et al.*, [8]

published an ancient water exploration technique based on Varāhamihira's *Bṛhat Saṃhita*. Majority of the publications provided information on the plants of chapter 54 of *Bṛhat Saṃhita*. Goyal [6] brought out a report on the ancient water exploration practices based on Varāhamihira's *Bṛhat Saṃhita* and the results have been discussed considering conditions prevailing in forests and deserts separately. It is evident from the above-mentioned literature survey that only on undercurrents/plant indicators (*Dakārgala*, chapter 54) of *Bṛhat Saṃhita* is floristically explored partially. There is no information on plants/trees from the other chapters of *Bṛhat Saṃhita* dealing with botanical aspects. Hence, there is a need to publish on the floristic analysis and on the plants and trees that were described in the other five chapters of the *Bṛhat Saṃhita* by Varāhamihira.

Discussion

***Bṛhat Saṃhita* - The 'magnum opus'**

The *Bṛhat Saṃhita*, a work on various aspects that includes Botany and related features. *Saṃhita* means a collection. It consists of 106 chapters with a total of nearly 4000 ślokas (verses). It deals with a large range of subjects, including the movements of planets and their influence on human life, geography, architecture, iconography, omens, manufacture of cosmetics, botany, precious stones and so on. Encyclopedic in character, the *Bṛhat Saṃhita* must have been of immense use to people, particularly to the kings of ancient India, providing guidance in their daily life in respect of many things. It shows the range and wide sweep of Varāhamihira's mind. One can obtain a holistic picture of India of his times from a study of the *Bṛhat Saṃhita* [7, 17, 20].

Among the 106 chapters described in the *Bṛhat Saṃhita*, Varāhamihira designated seven (07) chapters for plants and named them as (1) *Kusumalatā* on flowers and plants (chapter 29), (2) *Indradhvaja* on trees for banner and house building (chapter 43), (3) *Dakārgala* on undercurrents/plant indicators (chapter 54), (4) *Vṛkṣāyurveda* on gardening (chapter 55), *Vanasampraveśa* or *Vanapraveśa* on forest trees (chapter 59), *Gandhayukti* on perfumes (chapter 77) and *Dantakāṣṭhalakṣaṇa* on tooth-brushes (chapter 85). There are three glossaries of medical and botanical terms in three chapters. Though he intermittently mentioned on Botany and plants in other chapters, but the predominant chapters are the above-mentioned. The *Bṛhat Saṃhita* described various morphologic and physiologic features of vegetation as hydrologic indicators to locate sources of ground water at different depths. Hence, the *Bṛhat Saṃhita* establishes Varāhamihira as the first hydrologist who codified all the then existing knowledge on the subject in his *magnum opus*.

The Hindu calendar

The *Sūryasiddhānta* is a text (of unknown authorship) on astronomy and time-keeping, an idea that appears much earlier as the field of *Jyotiṣa* (*Vedāṅga*) of the Vedic period. The field of *Jyotiṣa* deals with ascertaining time, particularly forecasting auspicious day and time for Vedic rituals. The *Sūryasiddhānta* is the earliest treatise available on the subject of *Jyotiṣa*. Varāhamihira is credited with thoroughly revising the *Sūryasiddhānta*. He was the first astronomer to furnish a revised version of the Hindu calendar, after calculating the precession of the equinoxes from the period of the preparation

of the earlier *Sūryasiddhānta*. He employed *śūnya* or 'zero' as a positive numerical symbol [19].

Kusumalatā on Flowers and Plants

In the Chapter 29th of *Bṛhat Saṃhita* explains on majority of herbs, crops and weed plants with its characteristic feature of the particular plant or tree. There are 14 *ślokas* in this chapter. The floristic analysis is as follows - 45 tree species, 14 shrubs, nine (09) herbs, four (04) cereal crops, five (05) legume crops and two (02) water plants are included. In the *śloka* 1, it describes if the *Śāla* tree (*Shorea robusta* Roth.) should bear fruits and flowers, *kalama* (white rice) will grow in abundance; if the red *aśoka* (*Saraca indica* L.) should bear fruits and flowers red paddy will grow; if the *kṣīrika* should bear fruits and flowers white paddy will grow and if the black *Aśoka* should bear fruits and flowers black rice will grow. In the *śloka* 2, the growth of the *Nyagrodha* (the banyan tree, *Ficus benghalensis* L.) indicates the growth of yava (barley, *Hordeum vulgare*); the growth of *tinduka* [tendu, *Diospyros malabarica* (Desr.) Kostel.] indicates the growth of the *saṣṭika* rice; and the growth of the *aśvattha* (peepal, *Ficus religiosa* L.) indicates the growth of all crops. In the *śloka* 3, the growth of the *jambū* [the rose apple, *Angophora costata* (Gaertn.) Britten] tree indicates the growth of the gingelly and black gram; the growth of *śirīṣa* indicates the growth of the *kaṅgū*; the growth of *madhūka* [mahua tree, *Madhuca longifolia* (Linn.) Macbride] indicates the growth of wheat and the growth of the *saptaparṇa* indicate the growth of the barley. In the *śloka* 4, the growth of *atimuktaka* [mountain ebony, *Bauhinia variegata* (L.) Benth.] and that of *kunda* (*Cassia* species) indicate the growth of *kapāsa*

(silk cotton tree, *Bombax ceiba* L.), the growth of *asana* indicates the growth of *sarṣapa* [mustard, *Brassica juncea* (L.) Czern.]; the growth of *badarī* (juzube tree, *Ziziphus mauritiana* Lam.) indicates the growth of *kulattha*, and the growth of *cirabilva* [*Holoptelea integrifolia* (Roxb.) Planch.] indicates the growth of the *mudga* [*Vigna mungo* (L.) Hepper]. In ślokas 5 to 13, several plants, trees and crops were mentioned on their luxuriant growth. It is also explained that there will be good amount rain in those places where trees, shrubs and creepers grow luxuriantly with glossy leaves uninjured by worms, but if the leaves are infested, it indicates that there will be short of rains.

Indradhvaja on Trees for banner and house building

The chapter 43 is described with name Indra's banner (Indra-*dhvaja* or *dhvajastambha*). There are 68 ślokas were described. Matters connected with the fall of the tree, the cutting of it, and with what might be inside the tree have been treated off are described in the chapter on *Indra Dhvaja* and on house-building. It is stated in the śloka 12 that shall not cut any tree growing in flower gardens, in temples, on cremation grounds, on public roads, on sacrificial fire-sites or trees of short growth, or dried trees or trees of stunted growth at the top, thorny trees or trees surrounded by creepers and parasitical plants. In the śloka 13, shall also reject trees with holes in which dwell numerous birds and trees injured by the wind or fire and he shall reject trees of feminine denomination, for all those trees are not fit for the staff of Indra's banner. In the śloka 14, five trees such as (1) *Arjuna* [*Terminalia arjuna* (Roxb.) Wight & Arn.], *Aśvakarṇa* (*Dipterocarpus turbinatus*

C.F.Gaertn.), *Priyaka*, *Dhava* [*Anogeissus latifolia* (Roxb. ex DC.) Wall. ex Guill. & Perr.] and *Udumbara* (cluster fig, *Ficus racemosa* L.) are suited for the purpose. Having chosen one of these trees or another well-known tree, or one growing on yellow or black soil, the astronomer shall, alone and at night, approach it and touch it with the hymns.

Manuring, Grafting, Gardening and Plantation

The ancients had a pretty sure knowledge of the fact that the plants derive their food materials from the soil, and they had an excellent knowledge of the science of manuring. The origin of manuring the soil can be traced as early as to a verse of the *Atharvaveda* below:

बभ्रोरर्जुनकाण्डस्य यवस्य ते पलाल्या तिलस्य
तिलपिञ्ज्या।

वीरुत् क्षेत्रियनाशन्यप क्षेत्रियमुच्छतु ॥

। *bahrorarjūnakāṇḍasya yavasya te palālyā
tilasya tilapiñjyā* ।

vīrut kṣētriyānāśanyapa kṣētriyamuchatu ॥ -
Atharvaveda 2-8-3

The above verse explains, "With straw of barley tawny-brown in colour with its silvery ears, with stalk and stem of Sesamum- So let the plague-destroying plant remove inherited disease."

A more elaborate instruction on manuring is found in the *Bṛhat Saṃhita* in the whole chapter 54 is devoted to the purpose known as *Vṛkṣāyurveda*. Thus in *Bṛhat Saṃhita*, "to promote inflorescence and fructification, a mixture of one *adhaka* (64 *palas*) of sesame, two *adhakas* (128 *palas*) of excreta of goats or sheep, one *prastha* (16

palas) of barley powder, one tula (100 *palas*) of beef, thrown into one *drona* (256 *palas*) of water, and standing over for seven nights, should be poured round the roots of the plant. The measures given are for one plant. This measure is for all kinds of plants”.

Dakārgala - Underground Water and Springs Exploration using Plant Indicators

The term ‘*Dakārgala*’ in Sanskrit connotes ‘water exploration’. ‘*daka*’ means water (derived from the Sanskrit word ‘*udaka*’ for water) and ‘*argalam*’, a bolt or bar; i.e., ‘a branch of science dealing with water locked up or imprisoned in the bowels of the earth’. The *dakārgala* mentions several indicators to presence of underground water. These are geological, geo-botanical, bio-geological, and non-biological indicators of the surface and sub-surface of the earth that even today could be useful in several regions of India. The other common surface indicators of groundwater, such as termite mounds have also been mentioned [11, 20, 8].

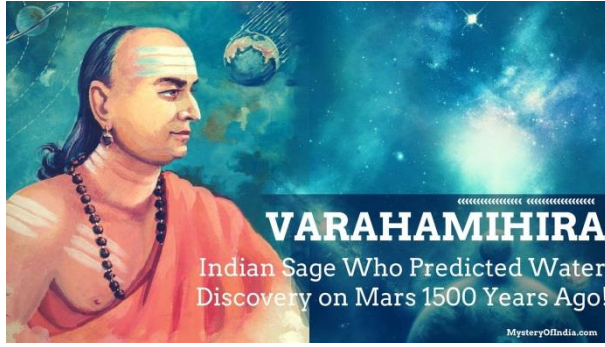
The plants/trees described in the Chapter 54 of *Brhat Samhita* can also be termed as biological indicator or bio-indicator or phyto-indicator or hydrologic indicators. In other words, plants which indicate some very specific conditions of environment are called plant indicators. The knowledge of relationship between plants and ecological factors can be used as an indicator of environment. Many plants are used as indicators of environment. In a plant community some plants are dominant and found in abundance. These plants are important indicators because they bear full impact of habitat. It has been seen, in general, that plant communities are better indicators than individual plants. Individual plants or

plant communities are used to determine the types of soil and other conditions of the environment. Sometimes these also indicate past or future conditions of the environment.

The knowledge of plant indicators can be helpful to determine local soil, thus it can be decided which crops should be cultivated in a particular soil and which soil should be left for pasture or other purposes. Plant indicators are also used to determine optimum use of land resources for forest, pasture, and agricultural crops. Many plants also indicate the presence of particular mineral or metal. So the presence of precious metal can be detected by the growth of the specific plant in an area.

In the Chapter 54, there are 125 ślokas are described. There are 100 species of trees, 15 shrubs, eight (08) herbs, five (05) cereal crops, four (04) legume crops and three (03) water plants.

In the ślokas 63-71, Varāhamihira describes the possibilities of water where ant-hills are present near tender bamboo [*Bambusa arundinacea* (Retz.) Roxb.], *rohitaka* [*Aphanamixis polystachya* (Wall.) R. Parker] trees, Indra trees and golden trees and the quality of water varying from sweet to brackish. Various ecological and environmental interactions are mentioned as indicators of groundwater under the following headings: (a) *phreatophytes* (a plant with a deep root system that draws water supply from near the water table) (b) *phreatophytes* associated with termite mounds, (c) symbiotic inter-growth of trees, i.e. a tree united with another tree species, and morphological, physiological, and mutational features of plants and plant cover (Prasad, 1980). Ślokas 72, 74, 75, 76, 78, 83 and 96 particularly describe the type of trees that show symbiotic



intergrowth and indicate water under the ground. The examples are: *Palāśa* (Flame of the forest, *Butea monosperma* (Lam.) Taubert) and *Badarī* (Jujube, *Ziziphus mauritiana* Lam.), *Bilva* [Wood apple, *Aegle marmelos* (L.) Correa] and *Udumbara* (Fig tree, *Ficus racemosa* L.), *Karīra* [Wild caper, *Capparis decidua* (Forssk.) Edgew.] and *Pīlu* (Toothbrush tree, *Salvadora persica* L.) and *Śami* [Indian desert tree, *Prosopis cineraria* (L.) Druce]. An isolated cold spot in a warm ground denotes cold water, while a solitary warm spot in cold ground indicates warm water (śloka 94). A copper-coloured soil mixed with gravel yields astringent water; pale yellow earth is indicative of salt, and a blue soil shows the presence of sweet water (śloka 104).

Springs of water in a woody tract (forest) are situated at a lower level than in open country, and in a desert even lower than in a woody region (ślokas 62, 86, 89 & 93). The appropriate places for digging wells in villages or towns are indicated in ślokas 97 and 98. Construction of embankments for ponds and the shading of the banks by trees are advised by him in śloka 119. Similarly,

Varāhamihira gives a recipe for a substance to be added to water. It is a mixture of *anjana*, *mustā*, *usra*, *rājakosātaka*, *emblic myrobalan* and *kataka* (ślokas 121 and 122). The plant indicators of different soil types that were described in the *Bṛhat Saṃhitā* are presented in the Table 1. The plant communities as ecological indicators for ground water in Indian deserts are elaborated in the Table 2. Varāhamihira suggests the asterisms which are propitious for sinking wells (śloka 123) and ends chapter 54 with comments on exploration for springs [13, 11, 20, 8].

The hydrological indicators documented in ancient India had a scientific basis; applied study is bound to go a long way in satisfying the need for water for irrigation, industrial and domestic use. Varāhamihira documented more than 100 plant species occurring (i) individually, (ii) in association with termite mounds, (iii) in presence of two or three different species together, and (iv) in conspicuous morphologic or physiologic features. With the aid of specific plants, sources of groundwater were located at depths varying from 2.3 to 160 m in different environments of arid and semi-arid regions. Varāhamihira estimated not only the depth of the groundwater but also the distance and direction with respect to the indicator plants [13, 11, 8, 6].

Gardening and Diseases (vr̥kṣāyurveda)

Table 1: Plant Indicators for Different Soil Types

S. No.	Plant Indicators	Characteristic of Soil
1	<i>Salvadora oleoides</i>	High calcium and boron, good soil suitable for crop plants
2	<i>Zizyphus mauritiana</i>	Good soil for agriculture
3	<i>Prosopis cineraria</i>	Good soil for agriculture crops provided irrigation is available
4	<i>Peganum harmala</i>	Soil is rich in nitrogen and salts and good for agriculture
5	<i>Butea monosperma</i>	Heavy alkaline soil
6	<i>Capparis decidua</i>	Alkaline soil
7	<i>Rumex acetosella</i>	Acid grassland soil
8	<i>Salsola, Suaeda fruticosa</i>	Saline water condition
9	<i>Andropogon scoparium</i>	Sandy loan type soil
10	<i>Argemone mexicana</i>	Recently disturbed or flooded soil
11	<i>Phyla nodiflora</i> and <i>Rumex</i> species	Nitrate rich soils
12	<i>Pinus</i> and <i>Juniperus</i> spp.	Uranium rich soil

There are 31 ślokas described in the Chapter 55. In these ślokas, 66 trees species, 22 shrubs, 11 herbs, six (06) cereals, (03) legumes and four (04) water plants are described. The ślokas from 1-31 suggests gardening trees on the banks of rivers and lakes and other water bodies will be pleasant and agreeable if planted with shady trees. It is therefore necessary to form gardens on the banks of waters. It also describes on controlling the diseases using the same plant material.

Forest Entry (*vanasampraveśa* or *vanapraveśa*)

In the Chapter 59, there are 14 ślokas described. In these ślokas, 61 tree species, 12 shrubs, 11 herbs, five (05) cereal crops, four (04) legume crops and five (05) water plant species are mentioned. The ślokas from 1-14 suggests on the entry of forests and behavior in the forests inside during the visit. On an auspicious day selected by the astrologer and suited to the master, when the several indications referred to on *Yātra* are all good, the party shall leave for the forest. They shall not cut trees that grow on cremation ground, in

Table 2: Plant Communities as Ecological Indicators for Ground Water in Indian Deserts

S. No.	Plant Communities	Indicated depth of ground-water
1	<i>Euphorbia caducifolia</i>	12-18 m
2	<i>Acacia senegal - Terminalia pendula</i>	12-18 m
3	<i>Salvadora oleoides - Tamarix species</i>	6.0 m
4	<i>Salvadora oleoides - Prosopis cineraria</i>	10-20 m
5	<i>Prosopis cineraria-Zizyphus mauritiana-Capparis decidua</i>	6.0-18 m
6	<i>Salvadora oleoides-Capparis decidua</i>	6.0-12 m
7	<i>Salvadora oleoides-Zizyphus mauritiana</i>	18-28 m
8	<i>Panicum turgidum-Zizyphus complex</i>	6.0-18 m
9	<i>Panicum turgidum-Polygonoides calligonum</i>	6.0-18 m
10	<i>Crotolaria burhia-Leptadenia pyrotechnica</i>	6.0-20 m
11	<i>Suaeda fruticosa-Aluorophus lagopides</i>	6.0 m
12	<i>Capparis decidua</i>	12-20 m
13	<i>Acacia indica-Prosopis cineraria-Salvadora oleoides</i>	12-20 m

roads, in temples, ant-hills, flower gardens, the abodes of religious devotees, places of worship, junctions of rivers as well as trees grown by human labour. They shall not cut trees that are bent, that are covered with creepers or struck down by lightning or broken by the wind, or that have fallen of them or that are broken by elephants or that have dried or have been burnt or that contain the bee-hive. The trees that are of glossy leaves, flowers and fruits, are fit for the purpose; the tree selected shall be adorned with flowers and duly

honoured. If the master is a *Brāhmaṇa*, the trees *Devadāru* [*Cedrus deodara* (Roxb. ex D. Don) G. Don], *Sandal* (*Santalum album* L.), *Śamī* [*Prosopis cineraria* (L.) Druce] and *Madhūka* [*Madhuca longifolia* (L.) Macbride] are fit for the purpose. If the master is a *Kṣatriya*, the trees *Margosa* (*Azadirachta indica* A. Juss.), *Aśvattha* (*Ficus religiosa* L.), *Khadira* [*Acacia catechu* (Linn. f.) Willd.] and *Bilva* [*Aegle marmelos* (L.) Correa] are fit for the purpose. If the master is a *Vaiśya*, the trees *Jīvaka*, *Khadira* [*Acacia catechu* (Linn.

f.) Willd.], *Sindhuka* and *Syandana* should be selected for the purpose; and if the master is a *Śūdra*, the trees *Tinduka*, *Kesara*, *Sarja* and *Arjuna* should be selected. In the formation of the *Liṅga* or an image, the sides of the tree as it grew shall be preserved.

Preparation of Perfumes (Gandhayukti)

In the chapter 77 under the category of perfumes, there are 37 ślokas described. There are 22 trees, eight (08) shrubs, 42 herbs, four (04) cereals, two (02) legume species and three (03) water plants mentioned. The beauty items of plant derived products are - flower wreaths, sandal paste, perfumed smoke, clothes and also to blacken and embellish the hair. Ślokas 1 to 6 describes on the beautification of hair and rich perfume baths using plant ingredients. Put into an iron vessel vinegar or the like sour liquor; put in it a quantity of the *kodrava* grain (kodo millet, *Paspalum scrobiculatum*) after removing the husk and iron dust; heat the mixture; grind it well on a stone; rub it over the hair of the head freed from oil; tie over the hair the moist leaves of the green juicy leaves; remain so for six hours. Then remove the mixture from the hair, and rub over them the paste of the fruit of the *āmalaka* (Indian gooseberry, *Emblica officinalis*); cover them with moist leaves as before and remain so for another six hours. Then the hair will become black. Mix together equal quantities of woody *cassia*, *costus*, *Reṇu*, *Nalikā*, *Spṛkkā*, *Tagara*, *Vālaka*, *Keśara* and *Patra* and grind them on a stone forming them into a paste; rub it over the head and then bathe; such a bath is suited to kings. Mix together in oil the powder of *Mañjiṣṭhā*, *Vyāghranakha*, *Śukti*, *cinnamon*, *Kuṣṭha* and *Myrrh*; heat the mixture in the Sun. It is known as *Campakagandhi* oil. In the

śloka 7, it is said to grind together equal quantities of *Patra*, *Turuṣka*, *Vāla* and *Tagara* and the person will get a perfume provoking sexual passion. Add to this perfume *Priyaṅguka* and expose the mixture to the smoke of *Kaṭukā* and *Hingulika*. This will provide perfume which is known as *Vakulagandha*. To this add *Kuṣṭha* and can obtain a perfume known as *Utpalagandha*. Add to this sandal, will become the perfume known as *Campaka-gandha*. Add to this *nutmeg*, *cinnamon* and *Kustambarī*; and that perfume is known as *Atimukttagandha*. Mix all the above said parts with one-fourth parts of *Śatapuṣpa* and *Kunduruka*, half-parts of *Nakha* and *Turuṣka*, and one part of *sandal* and *Priyaṅgu*; grind them well and expose the mixture to the smoke of *Guḍa* and *Nakha*. This will become an excellent perfume. The ślokas 9 and 10 describes in preparation of other perfumes using various other herbs. Grind together equal quantities of *Jaṭāmāmsī*, *Vālaka*, *Turuṣka*, *Nakha* and sandal and form a paste; expose it to the smoke of *Bdellium*, *Bālaka*, *lac*, *Musta*, *Nakha* and *Śarkarā*. One part of *Harītakī*, two parts of *Śaṅkha*, three parts of *Ghana*, four parts of *Drava*, five parts of *Ambu*, six parts of *Guḍa*, seven parts of *Utpala*, eight parts of *Śailaka* and nine parts of *Musta* give a perfume. Numerous kinds of perfumes can be similarly prepared by mixing together different parts of each substance in certain combinations using various herbs. These are provided in the ślokas from 11 to 37.

Tooth-brushes (Dantakāṣṭha-lakṣaṇa)

In this Chapter 85, nine (09) ślokas are described. There are 12 tree species, three (03) shrubs, four (04) herbs and two (02) cereal crop species mentioned in the ślokas. The

śloka from 1-9 suggests on the plant twigs that are used as tooth-brushes. It is still being used in the villages of India. The twigs of creepers, bushes, trees, and trees that grow widely can be used to make tooth brushes (*dantakāṣṭha*). A description of all their effects will be long and elaborate. Therefore, it is confined to twigs which are to be chewed to secure certain special ends are mentioned here. It is surprise to know that there is no mention of the neem tree as a tooth-brush, which is used very commonly in India. Twigs of unknown trees shall be rejected, and twigs with leaves, those of an even number of joints, those which are split or dry at the ends and those with no bark ought not to be chewed. The twigs of *Vikaṅkata* [Madagascar plum, *Flacourtia indica* (N. Burman) Merrill], *Śrīphala* (Indigo, *Indigofera tinctoria* L.) and *Kāśmarī* (*Gmelina arborea* Roxb.) if chewed, will give a person Brāhminical splendour. The *Arka* [*Calotropis gigantea* (L.) R. Br.] twig will increase the splendour of his appearance. The twigs of *Nyagrōdha* (Banyan, *Ficus benghalensis* L.), *Śirīṣa* (*Albizia lebeck* (L.) Benth.) and *Karañja* [Pongame oil tree, *Pongamia pinnata* (L.) Pierre] if used as tooth-brush will make a person wealthy and prosperous. Those of *Aśvattha* (Peepal, *Ficus religiosa* L.) will make him respected by the people and renowned among his own castemen. The twig of the *Badarī* (*Ziziphus mauritiana* Lam.) if chewed as a tooth-brush (*dantakāṣṭha*) will make a person healthy; that of the *Brhati* (*Solanum indicum* L.) will give him a long life; that of the *Khadira* [*Acacia catechu* (Linn. f.) Willd.] and *Bilva* [*Aegle marmelos* (L.) Correa] will increase his wealth; that of the *Atimukta* [*Hiptage benghalensis* (L.) Kurz] and *Kadamba*

[*Neolamarckia cadamba* (Roxb.) Bosser] will bring him the object of his desire. The twig of the *Nīpa* if chewed as a tooth-brush will bring wealth to a person; that of the *Karavīra* (Indian oleander, *Nerium indicum*) will bring him good meals; that of the *Bhāṇḍīra* (Bhandira, *Clerodendrum infortunatum* L.) will bring him much food; that of the *Śamī* (*Prosopis cineraria*), *Arjuna* [*Terminalia arjuna* (Roxb.) Wight & Arn.] and *Śyāmā* (*Echinochloa frumentacea* Link) will destroy his enemies. The twig of *Aśvakarṇa* (*Dipterocarpus turbinatus* C.F. Gaertn.), *Bhadrataru* (*Trapa bispinosa* Roxb.) and *Cāṭarūṣaka* (*Grewia asiatica* L.) is chewed as a tooth-brush will bring a man self-worth; if chewed the stalks of *Priyaṅgu* [*Setaria italica* (L.) P. Beauvois], *Apāmārga* (*Achyranthes aspera* L.), *Jambu* [*Syzygium cumini* (L.) Skeels.] and *Dāḍimā* (*Punica granatam* L.) will make a person beloved of all people.

Flora of Br̥hat Saṃhita

In the *Br̥hat Saṃhita* different types of plants and trees are mentioned. The flora of *Br̥hat Saṃhita* consists of 545 plant species that are used in medicine, perfumes, gardening and other purposes are described. Also, it is observed that some species of plant names are duplicated in the *Br̥hat Saṃhita* chapters mentioned. Among the 545 plants, 437 species belong to the class Dicotyledonous, 108 species belong to the class Monocotyledonous and one (03) species belongs to the Gymnosperm category, as per the Bentham and Hooker [1] taxonomic system of plant classification. The scientific names of plants are documented as per International Code of Nomenclature (ICBN) from the latest Indian floristic studies and the Royal Botanical

Table 3: Floristic Analysis of *Bṛhat Saṃhita*

Bṛhat Saṃhita Chapter No:	Trees	Shrubs	Herbs	Cereal Crops	Legume Crops	Water Plants
Chapter 29	45	14	9	4	5	2
Chapter 43	5	-	-	-	-	-
Chapter 54	100	15	8	5	4	3
Chapter 55	66	22	11	6	3	4
Chapter 59	61	12	11	5	4	5
Chapter 77	22	8	42	4	2	3
Chapter 85	12	3	4	2	-	-

Gardens, Kew, London. A total number of 522 plant species, belonging to 55 families, includes 311 tree species, 74 species of shrubs and 85 species of herbs. Amongst the 85 herbaceous species, there are 26 species of grasses, 18 legume grain species, 15 other herbs of different families, 17 aquatic plants, two (02) creepers and two (02) oil seed crop species. The chapter-wise floristic analysis of *Bṛhat Saṃhita* is listed in the Table 3.

Conclusions

Thus we have found that different Indian works and traditions contain various observations of plant-life that are scientifically valuable. We cannot but appreciate the keenness of spirit shown in these works. However, this spirit was not rigorously separated from fanciful superstitions and myths. This resulted in no further scientific advances in the study of plants and plant-life. It degenerated from science into an art, and from art into an artifice.

An important contribution of Varāhamihira is the encyclopedic *Bṛhat Saṃhita*. Although the book is mostly about

divination, it also includes a wide range of subjects other than prediction. It covers extensive subjects of human interest, including astronomy, planetary movements, eclipses, rainfall, clouds, architecture, and growth of crops, manufacture of perfumes, matrimony, domestic relations, gems, pearls, and rituals. He deals with a dizzying number of subjects in this encyclopedic treatise and gracefully condenses knowledge from all important walks of life for future generations.

The *Bṛhat Saṃhita* could indicate the occurrence of ground water at various depths with the help of different types of plants, trees and grass varieties used as plant indicators. Thus, Varāhamihira is established as the first hydrologist to compile all the knowledge on the subject in his *magnum opus* in the *Bṛhat Saṃhita*. Varāhamihira suggested various biological, pedological, geological, and geophysical characteristics as hydrologic indicators. A critical study of these indicators reveals that they are all primarily the results of the interactions between biotic and abiotic environment due to high relative humidity consequential to the occurrence of ground-

water in arid and semi-arid regions. He described various plant responses, in a ground water ecosystem as hydrologic indicators. This is the most significant aspect of this ancient work is that only those plant responses which are very obvious were employed as hydrologic indicators. These plant indicators are still being used in India by the geologists in identifying water resources.

From the present study, it is evident that the ancient science of gardening, treatment of trees and other aspects of plants/trees which was very much technical in nature. The ancient methodology for treatment of trees shall be helpful for the deep study in further research program in the area of ancient botanical science. The Indian concept of *Vṛkṣāyurveda* may be the real contribution of our ancestors to the intellectual world of science. So, this kind of study is a primary attempt in the light of gardening. The text of *Bṛhat Saṃhita* is creating the new path of research in the area of modern science of treatment of trees and vegetation. Moreover, the implementation of ancient Indian science and technology in the science education is a greater attempt to purify the current curriculum of education. It can be rightly said that *naven anavam śodhayet* meaning “relook the ancient sources of knowledge in modern perspective”.

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Varāhamihira humbly said about his own treatises: “*The science of Astrology is a vast ocean and is not easy for everyone to cross it. My treatises provide a safe boat.*” Truly, even now they are acknowledged as masterpieces.

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Nature and Its Cyclic Path

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Abstract

Our Sanatana dharma has marvelously introduced the concept of birth and death as the elevated or cyclic path of complex-coupled nature in terms of legends and karma (action). According to this, a new universe is brought into existence through the transformation of Moola Prakriti/Pradhana (Universal primitive/root matter) by Sanatana Para Brahma (= Sat+chit+Ananda = Satyam+Ritam+Brihat +Anantam) from the state of total dissolution. Many Vedic theories style this as 'forming from Parama Shunya = Avyakta Aakaasha (Om Kham Brahma from Shukla Yajurveda). This indeed makes a hallmark approach to understanding the nature of the Supreme Divine = Paramaatma, through the Vedas and Sanatana Dharma. In this article, the authors make an attempt to discuss Time, Space, Universal singularity, and Karma theory, using the Progressive discoveries from the physical and Biological Sciences, particularly those of Material science and Evolutionary Biology.

Key words: Nature, cyclic path, Karmic action, *Rig-Veda*, singularity, cosmic paradox, evolutionary science

Introduction

Nature has always been a panorama for observation and understanding of the universal grand design, starting from the Big Bang (chaos) to the present modern age. This broad spectrum certainly confirms the following couplet:

**The existence of nature is not a miracle,
But its absence would be one!**

Scientists have always marveled at the origin of the world and tried to explain it with a number of hypotheses. The one that is accepted and being used in the present age is Quantum field theory. It is believed that the Universe (nature) is a self-organizing, complex-dynamical, chaotic, multiple-feedback system, following an evolutionary

path right from the Big Bang over the past 13.8 billion years. New discoveries are contributing to improving our understanding of the theory of Cosmic (including life) Evolution. Based on the theories, one can conclude that life forms (entities of living) are constrained by nature's laws and incapable of violating them, and vice versa. So, it is a kind of mutually coupled Autopoietic system. The same thing has been stated by many Hindu texts: *Karma* (Activity) and *Maaya* (Supreme Screening Power) are coupled with each other. Nature follows its own specified path, depending on the Karmic actions, at the points of multiple paths influenced by dynamic feedback.

In view of the aforementioned puzzle, an attempt is made in this study and discussed

in the following sections. The different methods adopted in our mythological aspects of nature worship clearly explain to us that nature is a system with a chemical nature of an auto-cyclic system from birth to death, then again to birth, and so on. A few questions that arise in this context are: 'Why is only this type of system prevalent? What is its purpose? What is the size of the universe? In addition, the following paradox, which is prevalent globally, is clarified by a philosophical approach, discussed in *Rig-Veda* (10-129-7, Nasadiya Sukta) [1].

इयं विसृष्टिर्यत आबभूव यदि वा दधे यदि वा न ।
यो अस्याध्यक्षः परमे व्योमन्त्सो अङ्ग वेद यदि वा न
वेद ॥

"He is the first origin of this creation. Whether he formed it all or did not form it. Whose eyes control this world in the highest heaven? He verily knows, or perhaps he does not."

Studies - A Philosophical Approach

Hinduism is built on a system driven by ethics within the universal frame and showing a path from darkness to light. After the big bang, the universe began to expand, and it is still continuously expanding. Stars will be born, grow, and explode in supernovae. From the star dust, new stars, perhaps smaller ones, will begin to evolve. The brilliant flashes of intense radiation from supernovae have shown a path for understanding the evolution of stars and planetary systems. In understanding this phenomenon, an important parameter is the average density [2]. If the average density of stars increases, the universe ceases to expand and collapses back into a singularity. This would lead to another big bang, and this cycle repeats over and over. On

the other hand, if the universe is less dense than its true value, it will be open and continue to expand forever. There will be no end until it reaches its own critical value, then a new universe will be born from the remnants of an earlier universe. A hypothesis says that we cannot measure the density of the universe so accurately. To understand more about this, the physicist's approach is as follows:

Time:

Based on the Archimedes calculation, one can say that the size of the universe is equal to the square of size of solar system divided by size of the earth. He has concluded that the universe could hold 10^{63} grains of sand [3, 4]. Bhagavata purana says that cosmic egg (universe) has a diameter of 500 million yojanas (5×10^{15} yojanas \sim 6.8 trillion light years in diameter) [5]. But according to the modern scientific calculation, the size of universe is almost seven (7) trillion light years [6], almost as same as that of quoted by Srimad Bhagavata Purana.

Though physics has developed a lot, still this cosmic puzzle is yet to be solved, for two reasons. Firstly, it deals with fundamental constants, and secondly it requires lot of approximations [7]. Moreover, if the main dimensionless cosmic equations are plotted on a logarithmic scale, then it forms two groups, namely large and small (unitary) groups respectively. The fundamental constants G, c and \hbar give rise to the following relations [7]:

$$\begin{aligned} \text{Planck's length} &= a^* \\ &= (\hbar G/c^3) \sim 2 \times 10^{-33} \text{ cm} \end{aligned} \quad (1)$$

$$\begin{aligned} \text{Planck's mass} &= m^* \\ &= (\hbar c/G)^{1/2} \sim 2 \times 10^{-3} \text{ g} \end{aligned} \quad (2)$$

$$\begin{aligned} \text{Planck's time} &= t^* \\ &= a^*/c \sim 6 \times 10^{-43} \text{ s} \end{aligned} \quad (3)$$

Here, the terms G , c , and h represent the Universal gravitational constant, the velocity of light and Planck's constant ($h = h/2\pi$). The above mentioned time duration is referred to as 'jiffy'. Finally, it is derived hypothetically that the size of the universe is equal to L/a . Here the terms L and 'a' represent Hubble length and radius of the electron respectively. It is a known fact that G changes with time as the universe expands. Therefore, one can say that the above defined relations change, if G alone changes with time. This kind of paradox is well explained in the Srimad Bhagavad Geeta (chapter 11, verse 32) as "kālo 'smi loka-kṣhaya-kṛit pravṛiddho..." [8].

कालोऽस्मि लोकक्षयकृत्प्रवृद्धो लोकान्समाहर्तुमिह
प्रवृत्तः |
ऋतेऽपि त्वां न भविष्यन्ति सर्वे येऽवस्थिताः
प्रत्यनीकेषु योधाः ॥

The Supreme Lord said: "I am mighty Time, the source of destruction that comes forth to annihilate the worlds. Even without your participation, the warriors arrayed in the opposing army shall cease to exist".

A more plausible explanation given for Time (*kala*) and space (*distance*), described in *Rig-Veda* (1-95-7) as [2]:

उद् यंयमीति सवितेव बाहू उभे सिचौ यतते
भीम ऋञ्जन् |
उच् छुक्रम् अत्कम् अजते सिमस्मान् नवा
मातृभ्यो वसना जहाति ॥

"Both time and space are eternal. No one can imagine origin and limit of Time and Space.

Space contains everything and makes our moments possible.

Times conditions and regulates the generating growth and dissolution of every material thing."

Both unmodified time and space are not perceived by our senses. However, they can be perceived by the intuitive power of our soul, at the stage of moksha (*kaivalyam*). Here, one should remember that God lives in time and space, and moves with the time. In other words, Time-god is a coupled nature or phenomenon and cannot be separate out. Time and space are God's *vibudhi*. The same concept was indeed introduced by Albert Einstein as "time and space are inextricably linked coordinates".

Universal singularities:

With Carbon-14, radioactive isotope, found in the earth's atmosphere, one can arrive at an estimate of the archeological eras, to a reasonable accuracy [9]. The carbon-cyclic process is shown in the Fig. 1. Plants are autotrophs, which mean they can prepare their own food by means of photosynthesis processes. During this process, plants take in carbon dioxide (CO_2) and water (H_2O) from the air/soil. Here, water gets oxidized (means loses electrons), while the carbon dioxide is reduced (gains electrons). Thus, water transforms into oxygen and the carbon dioxide into glucose. The plant then releases the oxygen back into the air, and stores energy within the glucose molecules. Finally, humans and animals have survived by eating plants. A carbon-12 isotope is abundant and remains stable in the atmosphere; however, carbon-14 isotope decays into nitrogen-14 with a half-life of 5730 years [9]. However, this method has

some limitations like carbon contamination and animal based -glues. On the other hand, industrial and nuclear wastages certainly pollute the atmosphere and one cannot estimate the true archeological period is given in the Fig. 2a [Wikipedia].

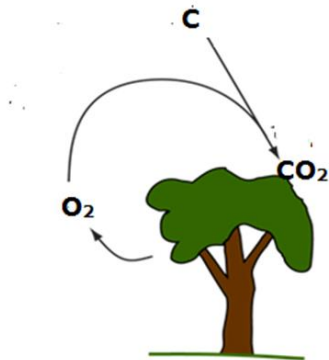


Fig. 1: Carbon cycle

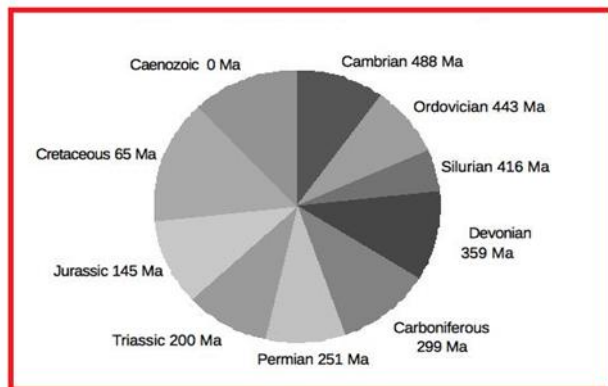


Fig. 2a: Archeological survey (Ma = million years) [Wikipedia]

Darwin's theory, proposed in the early 19th century explains well about the diversity among living beings. But it could not properly explain the following striking discrepancies:

- (i) Why this diversity exists?
- (ii) Transformation of one species to another kind.

The above two effects can be generalised again on the basis of two factors: (a) survival

of the fittest and (b) Random mutations. These have been modified by nature and nurture coupled with discoveries in epigenetics. Life forms have evolved in response to cosmic and terrestrial homeostatic and actastrophic phenomenon. If these two factors were absent then, all animals would live and might have maintained an eco-balance system. As environment changes from time to time and therefore species get adapted to their own characteristic features. This might have resulted in different skin colors across the globe. Monotheistic religions do not approve the theory of Evolution, from one kind of species to another kind.

In various faiths, it is broadly believed that animals, with specific characteristics suited to adapt to prevalent atmosphere, were created by God around 6000 years ago. This is in contradiction to the evolution theory, based on the science. So they have concluded that the Darwin theory is false because God cannot be false. In addition, the most puzzling question is why does a particular species exist and what is its purpose? This question was answered well by Hinduism in the following karma theory.

The origin of life began with some chemical reaction of molecules to form amino acid and then gradually evolved into a single cell and then into multicellular organisms. This kind of complex evolution can be corroborated to the *Dasavathrams*. The main transformation from one species to another species depends up on the following karma theory [10]. Based on the individual spiritual power, the classification is:

- (i) *Adhibhutam* (physical phenomenon or created at a certain point and will be annihilated at a certain point)

(ii) *Adhidaivatam* (the conception of the universal form of the Supreme Lord, which includes all the demigods and their different planets)

(iii) *Adhyatman* ('highest soul.' atma, means 'self' and *adhi* means 'above')

Our Vedic science has always shown a pattern of cyclic nature.

पुनरपि जननं पुनरपि मरणं पुनरपि जननी
जठरे शयनम् ।

इह संसारे बहु दुस्तारे,... भज गोविन्दं भज
गोविन्दं गोविन्दं भज मूढमते ॥

The above thought provoking couplet given by Sri Adi Sankaracharya [11] raises the two most significant and puzzling questions like "Why this world is existing?" and "What is death?"

A cycloid is the path described a point on a circle rolls along a straight line. Here, the point on the circle is life and the path is in action. Moreover, this kind of cycloid path is largest path and follows simple harmonic motion (or sanathan or ideal Dharma) under the gravity or the nature. A death and birth process (event) would occur at each singularity where cycloid path touches time axis. This chain process will continue and may even break and results into the beginning of a new universe. A schematic diagram of cycloid path is shown in the Fig. 2b. According to the *Rig-Veda* (6-9-4), Time or God defined as [10]:

अयं होता प्रथमः पश्यतेममिदं ज्योतिरमृतं
मर्त्येषु ।

ध्रुवं ज्योतिर्निहितं दृशये कं मनो जविष्ठं
पतयत्स्वन्तः ॥

"He is first invoker. Look at him and this light
immortal within mortals.

The firm light, which is blissful and subtler than the mind, is hidden within the senses. The spirit is hidden within the creatures."

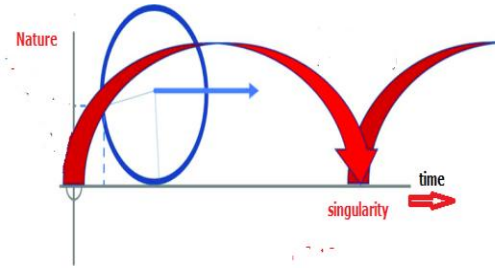


Fig. 2b: Nature-time graph (cycloid path)

Nature and Karmic results (Universal law)

The microscopic origin of the materials can be explored from the asymmetric behavior of the imaginary part of the impedance (resond function) with frequency (inverse of time), in a close proximity. To extract more information about inherent (dielectric) nature and relaxation (switching over) phenomenon, on natural substances (banana, botanically named as *Musa acuminata* Colla), kidney stone (became sick, due to bad habits) and barium titanate ceramic (man could also develop useful substances like $BaTiO_3$, referred to as technologically promising electro-ceramic, being used in many sensors). A detailed aspect of this is already discussed elsewhere [13].

Electrical impedance (Z) and phase angle (θ) were measured using impedance analyzer as a function of frequency in the radio frequency range (1 KHz to 1MHz) at room temperature. A change in real and imaginary part of impedance (Z' and Z'') with frequency at room temperature for a banana peel sample (BP), kidney stone sample (KS) and barium titanate (BT) is shown in Fig. 3(a-c), respectively. From the plots, it is clearly observed that Z' minima falls on Z'' maximum

value. This trend is generally attributed to ideal (classical or Universal or Debye nature) [14]. From the log-log plot it is clearly seen that the data is found to fit linearly. Moreover, the linear-nature and having exponent, less than unity, confirms the small deviation from ideal (classical) behavior. The universal relation is explained by the equation, $f \propto B\omega^n$. Here, f and n denote the response function and exponential value. The value of n is related to the linear nature of the respective plot. Based on the linear nature one can speculate that the KS and BP samples are belonging to Debye (ideal) type. Here dielectric dipoles become dominated in KS and BP unlike BT sample, where mobile charge carriers affect the overall collective (dielectric) properties. Since KS and BP compounds have water traces, and therefore the water molecule may play role in the inherent (dielectric) properties. A noteworthy aspect of dispersion observed in the high frequency region for KS sample indicates that the kidney stone has a high degree of disorder nature. In our earlier studies, FTIR peaks (weak bands observed at 1620 cm^{-1} and 661 cm^{-1}) were ascribed to the bending and wiggle modes of the water (H_2O) molecule (see ref.13). Based on the intrinsic (dielectric) nature of the kidney stone, it is concluded that the properties of the kidney stone could be related to their behavioral due to the food-habits. Moreover, the aggregation and adhesion of particles may help the growth of the kidney stones in vivo. With a proper diet, good-food habits and proper drinking of water, one can arrest the growth therapeutically [15]. The *Rig-Veda* (10-5-1) says:

कः समुद्रो धरुणो रयीणाम् अस्मद् धृदो
भूरिजन्मा वि चष्टे ।
सिषत्त्यू ऊधर् निण्योर् उपस्थ उत्सस्य मध्ये
निहितम् पदं वेः ॥

“He is one ocean, contains all matter having many births he sees inside our hearts.

He suckles the lap of the secret couple; the dwelling place of the Bird is within the fountain.”

A detailed aspect of this is already demonstrated in our Yoga. Our Vastu (a traditional Indian system of architecture based on ancient texts) balances the five elements (*indriyas*) namely, the hearing, vision, breath, touch and fire (*agni*). Any disorder in human body indicates the imbalance of one or more elements. Thus, by adopting Naturopathy (yoga), one can improve or overcome any disorder. In brief, the following table 1 summarizes all the association of *bhootas* and its characteristic senses [15, 16].

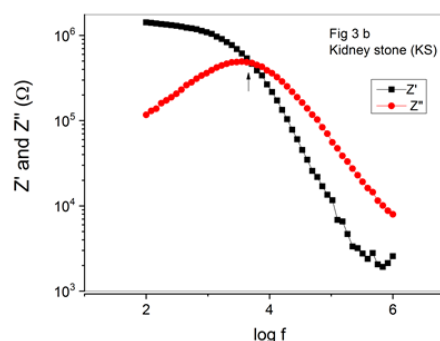
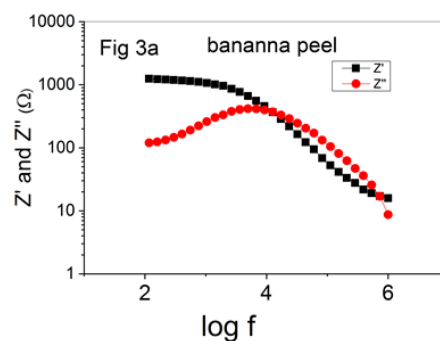
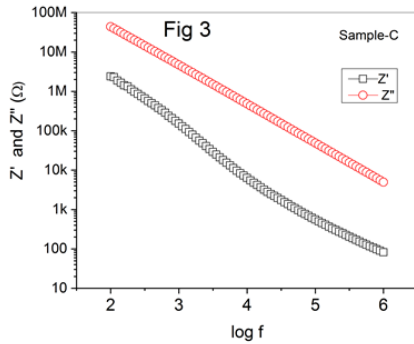


Table 1: Bhootas and Its Characteristic Principles

<i>Bhootas - Elements</i>	Human body	Associated finger	Characteristic principle	Sense organ
Akash (space)	Astral body	Middle	Sound	Ears
Vayu (air)	Air	Index	Touch	Skin
Agni (fire)	Body heat	Thumb	Appearance	Eyes
Jal (water)	Water in blood	Little	Taste	Tung
Pruthvi (earth)	Flesh, bones	Ring	Smell	Nose

**Fig. 3a-c:** Variation of real and imaginary part of impedance vs. frequency**Conclusions and future scope**

The life and nature are interrelated and they satisfy the function-property, scientifically known as singularity. This cycle repeats over and over or even forever.

वि मे कर्णा पतयतो वि चक्षुर् वीदं ज्योतिर्
हृदय आहितं यत् ।
वि मे मनश् चरति दूरआधीः किं स्विद्
वक्ष्यामि किम् उ नू मनिष्ये ॥

“My ears and my eye fly forth strive to see the light that spread wide within the heart.

My mind wanders far away-what I can speak of, and what can I think?” - (RV 6-9-6).

It is generally believed that religion and science are two distinct lines of thought and seldom agree with each other. A correlation between science and religion may be arrived by detailed studies on various Mandalas of *Rig-Veda*. Repeated study of *Rig-Veda* uncovers layers of information based on a deeper understanding. *Rig-Veda* is a collection of studies and praises of prevalent forces in nature and it can protect our well-being.

ऋतस्य पदं कवयो नि पान्ति गुहा नामानि
दधिरे पराणि ॥

“The sages protect the dwelling place of the Cosmic Order (or Motion), and take on higher secret names” - (RV 10-5-2.2).

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Cultivation Techniques as described in the Vedas

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Abstract

‘*Bharatha Desham*’ most popularly recognized and addressed as India is a spiritual land. Also, it is the birthplace of almost all branches of sciences and arts. The science and technology used by our sages and seers to a greater extent serve as references to the modern scientists of the present generation. Bharath due to its rich culture and heritage was the most prosperous and developed country. There was no branch of sciences or arts unknown to them. They were very intellectual and knowledgeable people with great skill and talent. They have artfully weaved science and spirituality together with all their wisdom and intelligence. These rituals and traditions that we uphold in daily life and on special occasions are always supported by scientific justifications that, at times, go beyond the capabilities of so-called modern scientists. In the present article, I wish to bring out some important agriculture and farming aspects deliberated in the Vedas and in the *Samskrita Vangmayam* are discussed here.

Introduction

Sanskrit literature is a treasure house of knowledge - an encyclopedia for all the different branches of sciences and arts. This sacred and divine language has the roots for many scientific and social concepts which are very much essential for the survival, peaceful and prosperous life of all living creatures. The ancient Sanskrit scholars were well equipped with the knowledge of life sciences as well. The glimpses of which can be found even in Vedas.

It is interesting to note that the Vedic agricultural system was enriched and was supported by numerous references to different stages of cultivation, ploughing, sowing, harvesting, trashing and presentation of agricultural production etc., Different type of farmers, agricultural implements of Vedic literature give us a clear idea of developed

agronomy. Since the primary requirement of any being is food. Man started to think about production because without production consumption is impossible. *Rgveda* (RV) and *Atharvaveda* (AV) are the Vedas which have two entire Vedic hymns on agriculture. There are several Veda mantra references on land farming, different agricultural implements, irrigation, farmers, fertilizer, and crops etc., which demonstrate that the agricultural techniques are well existed during the Vedic period. Also, there are several references on the subject of Agriculture and Botany in the *Samskrita Vangmayam* texts such as Ramayana, Mahabharata, Bhagavatam, Vriskha-Ayurveda, Bṛhat Saṃhita, Upavana vinoda, Charaka Saṃhita, Manusmriti, Sayana Bhashyam, Krishi Pradhana Parashar, Arthashastra. In the field of Botany and Agriculture our great Indian sages, who are

scientists, had tremendous vision, which can be witnessed by the world today.

Previous works

Boddupalli (2021) published a comprehensive research article on agricultural terminology, tools, seasons, crops, favorable crop for each season, number of crops possible for each season and discussed that are revealed in the Vedic texts. Muralidharan (2023) brought an article titled, 'Agriculture Implements in the Vedic Literature', where about ten implements are discussed and compared with the modern agriculture implements.

Cultivation Techniques - Crop cultivation during Vedic period

From the time of Vedic period, Bharath was an agriculture based economy. In *Rgveda* (10-34-13) advises land farming as the best means of gaining wealth. In Atharvaveda परिकीर्तिताः । The king Pruthu Vainya, a scion of Vaivasvatha Manu invented cultivation of crops and people used to take these crops as the means of their living. Thus, cultivation was accepted as the best rural profession. According to Yajurveda, land or agricultural field is the primary need for cultivation and it is the best place for sowing seed. In Vedic period also one of the duties of the king was to look after the progress of agriculture. In *Rgveda* there are so many hymns invoking Gods to shower their blessings so that we can overcome obstacles in the process of cultivation.

The *Parjanya Sukta* of *Rgveda* (5-83) describes the importance of Lord Parjanya and how people pray to the Lord to shower his blessings not only for abundance of rainfall

and also to protect the crop and the earth from all evils.

यस्य व्रते पृथिवी नन्नमीति यस्य व्रते शफवज्जर्भुरीति ।
यस्य व्रत ओषधीर्विश्वरूपाः स नः पर्जन्य महि शर्म
यच्छ ॥ – RV 5-83-5

Meaning: O' Parjanya Deva, at your command the earth remains fertile and all living beings are nourished.

वि वृक्षान् हन्त्युत हन्ति रक्षसो विश्वं विभाय भुवनं
महावधात् ।

उतानागा ईषते वृष्ण्यावतो यत्पर्जन्यः स्तनयन्
हन्ति दुष्कृतः ॥ – RV 5-83-2

Meaning: Lord Parjanya has the power to crush that which is unwanted on this earth and to destroy the demonic forces; all creation fears his stupendous might. Even those who are good shy away as Lord Parjanya annihilates the wicked through his raging storms.

In the *Sita Suktam* of *Rgveda* (4-57), it discusses about the devotion of farmers seeking the blessings of Goddess Sita to protect all of us and shower Her blessings for abundant harvest.

अर्वाची सुभगे भव सीते वन्दामहे त्वा ।

यथा नः सुभगाससि यथा नः सुफलाससि ॥ – RV 4-57-6

Meaning: O' Devi Sita, turn towards us and be gracious, we extol and worship you. (The name Sita is a synonymous name for *Prithivi* or mother earth. The Sita Devi mentioned in the *Rgveda* is much earlier than Ramayana Sita). You become favorable to us (by showing your blessings), so that you become the source of abundant harvest.

इन्द्रः सीतां निगृह्णातु तां पूषानु यच्छतु ।

सा नः पयस्वती दुहामुत्तरामुत्तरां समाम् ॥ – RV 4-57-7

Meaning: May Lord Indra take hold of the furrows while we plough and may *Pushan* sustain Her (i.e., the furrows). May She

(Mother Earth) who is full of milk, yield us abundant crops year after year.

The *Taittirīya Saṃhitā* (TS 5-1-7(3)) clearly mentions that there were two harvests (*sasya*) a year. The winter crop was ripe by the month of *Chaitra* (March-April) according to the KB (19-3). The *Kāṭhaka Saṃhitā* describes the deep plowing for the rich production of paddy and barley.

तस्माद् द्विस्संवत्सरस्य सस्यम् पच्यते ॥ - TS 5-1-7(3)
Since rain is most essential for agriculture. Cloud is praised as personified deity. Agriculture depends not only on water but also on all the five primal elements. For production of crops all these pañcamahābhūtas are most essential in different forms. Earth or land or soil is the primary need for sowing seeds. Water supplies the essential sap for growing the plants, in the form of rainfall or irrigation from river etc. Without heat (*tejas*) growth is impossible. Air (*Vāyu*) is essential for fertility. Maruts are praised as grinder of soil (*pipiṣvatī*). Without space crops cannot take shape. So agriculture depends on the entire natural phenomenon. The *Śatapatha Brāhmaṇa* says - *sarvade vatyā vai kṛṣiḥ*.

To denote the agricultural field or cornfield the term *kṣetra* is mostly used in the Vedic literature. The lord of field '*Kṣetrasya pati*' is actually the presiding deity of field, praised in the Vedas for good crops. Different types of agricultural lands are mentioned in the Vedas: cornfield full of ripened corns (*pakvam kṣetrāt kāmādughā ma eṣā*), barren land, pasture-less land (*agavyūti kṣetram, khila or khilyā* i.e. waste land (*khile gā viṣṭhitā iva, urvarā*) or fertile land (*apnavatīṣu urvarāsn iṣṭanī*) etc. Indra is treated as the possessor of thousands of fertile lands (*taṃ naḥ sahasrabharam urvarāsānī*). The Ṛgveda also

records that due to the blazing of fire the fertile or productive land are changed in waster or uncultivable land (*uta khilyā urvarānām bhavantī*).

Different types of farmers are recorded in the Vedas and they are named according to their works viz. *kārṣivana* 'cultivator', *kināśa* 'farmer', *sīrapati* 'ploughmen', *vapa* 'sower', *dhānyakṛt* 'sower of paddy seeds' and *iḍavā* 'carrier of ripen corns or grains to a granary'. The Vedic terms *kārṣivana* and *kināśa*, the linguistic basis of later word *kiṣāṇa*, remind us the motto of Indian agricultural society – '*jay jawān jai kisān*'. The Atharvaveda records that the gods ploughed a cornfield to produce this barley, where the ploughman is Indra and the Maruts are the cultivators who give rich gifts. *Kārṣivana* or cultivators are also known as *annavid* (*nikhananto agre kārṣivanā unnavido*). Farmers are used to toil the land with ox for the production of sweet beverage (*śrameṇa anaḍvān kīlālaṃ kināśascābhi gacchataḥ*). For refreshment a ploughman is most essential (*irāyai kināśanī*). The expert sower of paddy seeds is known as *dhānyakṛt* (*vapanto brjamiva dhānyākṛtaḥ*). According to the *Śatapatha Brāhmaṇa*, *Gandharvas* were also competent cultivators possessing winnow and barley (*gandharvā āsuh sūrpaṃ yavamān kṛṣir advālavān dhānāntarvān*).

In the Vedas ploughing is recorded as an auspicious mark of happiness indicating prosperity. *Śuna* (prosperity or happiness) and *sīra* (plough) are two deified objects related with agriculture (*śunāsīrāvīmāṃ vācam juṣethām*). Following the above two mantras, depict a real picture of tilling a land with the bullocks, happily by a farmer. All the agricultural objects like plough, ox, ploughman, the binding rope, the goad, etc. are

the mark of prosperity. Again, as a symbol of prosperity, *śuna* and *sŚra* are conjointly praised.

Here we find that the ploughman is tilling the land happily with the sharpened ploughshares and praying to cloud for sufficient rain. The Atharvaveda records a beautiful mantra describing a well-shaped, lance-pointed and sharpened plough with a handle (*lāṅgalaṃ pavīravai suśīmaṃ somasatsaru*).

Mainly two agricultural seasons are noticed in the Vedas - Kharif (July to October) and Rabi (November to March/April) as two principle seasonal crops (*dviḥ samvatsarasya sasyaṃ pacate*). Generally, most of the agricultural crops take three months' time for complete production and hence at least four seasonal harvests are mentioned in the Taittirīya Saṃhitā....These are the time of ripen crops like barely for summer, medicinal herbs for the rainy season, paddy in autumn, and beans and sesamum in winter. According to the *Kauśītaki* Brāhmaṇa, after one day of *caitra amāvasyā* (i.e. *caitra śukla pratipadā*), the winter crops are ready for harvesting.

In this context agricultural implements may be discussed in brief. Though we cannot compare the agricultural implements of Vedic period with the modern advanced and scientific implements of agriculture but old and rough implements like wooden plough with a sharpened ploughshare for tilling the agriculture land with bullocks is still the base of rural economy. To indicate a plough following terms are used in the Vedas: *lāṅgala*, *sīra*. *Phāla* and *stega* denote ploughshare which actually tills the soil; tilled by a ploughshare. The term *īsa* means the plough-stilt or the long wooden stich

connected with the plough; Yuga means a yoke and varatrā denotes a rope for binding the bulls with the yoke and plough. Handle of a plough is known as traru in the Vedas. For controlling the yoked oxen, two implements are used – *aṣṭrā* and *tottra* to denote a goad. *Sṛṇi* and *dātra* 'sickle' (cf. *dātāram* in Santali language) are used for reaping the harvest (lavana). *Khanitra* (shovel) is also used in the Vedas for digging the soil. The Vedas record the use of *śūrpa* for winnowing the ocns like paddy, barley, etc. and *titaṃ* for clearing the flour made of barley (*saktumiva titaunā punantaḥ*). The two terms *sīra* and *laya* are used conjointly for two functions furrowing and harrowing a field respectively (*sīrañca me layaśca me*).

On irrigation, fertilizers, prevention from natural calamities etc. are as revealed in the Vedas. Though the agriculture mainly depends on adequate rainfall (*kṛṣiśca me vṛṣṭiśca me*) but as a substitute the Vedic farmers take the help of man-made irrigation system for watering the cornfield. The *Ṛgveda* (VII.49.2) describes four types of irrigated water (1) rain (*divyāḥ*), (2) from well (*khanirtimā*), natural (*svayamjāḥ*) and (4) from those rives which are mixed with sea (*samudrārthāḥ*). Artificial irrigation could be guessed from the Vedic terms '*khanitrimā āpah*' from irrigation from well and hardam kuly for irrigation from canal.

For growing the yielding capacity, manures or fertilizers are also used in the agricultural field. Mostly cow dung is used as manure and it is known to the Vedic seers as *karīṣa*, *śakan*, *śakṛt*, etc. They know that the use of adequate cow dung in an agricultural field results to a rich harvest (*karīṣinīm phalavatīm svadhām, nityapuṣṭām karīṣinīm*)

Vedic seers are also conscious about the controlling method of natural calamities. The Atharvaveda records that the evils like moles, rats, birds, insects, excessive rain and draught could damage the crops. The same could be prevented by some spells (*hataṃ tardam samaṅkam ākhum aśvinā chintam... tarda hai, pataṅga hai jabhya hā upakvasa*)

In crop production, harvesting is an important work as if the farmer is not able to collect the ripen corns in time surely he has to face a severe loss. The farmers plough the fields, scatter the good seed on fertile land which is fed and watered by natural phenomena but the ripen corn is cut or reaped by farmers with cutters like sickle etc. as cleared in one of the mantra of *Ṛgveda* which means that.. After reaping the ripen corn, they bound into bundles and beaten out or threshed onto the floor of granary (*khale na parṣān prati hanmi*).

In agriculture, a farmer will overwhelm when he finds the production from three types of cornfields – *urvarā* (fertile), *iriṇa* (barren land) and *śaspya* (marshy land), corn from cultivable land (*kr̥ṣṭapacye aśane dhānye*). The *Yajurveda* records twelve types of food-grains in the following manner... These twelve corns are: *vr̥thi* (paddy, *Oryza sativa*), *yava* (barley, *Hordeum vulgare*), *māsa* (a kind of bean, *Vigna mungo*), *tila* (*Sesamum indicum*), *mudga* (a kind of bean, *Vigna radiata*), *khalsa* (chick-pea, *Cicer arietinum*), *priyaṅgu* (panic seed, *Panicum italicum*), *aṇu* (Proso millet, *Panicum miliaceum*), *śyāmāka* (a kind of millet, *Echinochloa frumentacea*), *nīvāra* (wild rice, *Oryza rufipogon*), *godhūma* (wheat, *Triticum aestivum*), and *masūra* (a kind of lentil, *Vicia hirsuta*). It is very interesting to note that most of these cultivated grains are

known as *dhānya* in the *Bṛhadāraṇyaka Upaniṣad* (6-3-13) as all these grains are most essential for sustaining life. According to this *Upaniṣad* there are ten cultivated grains: rice, barley, sesamum, beans, millet, panic seeds, wheat, lentils, pulses and vetches.

Apart from cultivation preservation of food grains also is an important factor which was well known to the people of Vedic period. The term *khala* is used in the Vedas for ‘threshing floor’ and *khalapā* is a granary made of bamboo mats. The terms – *ūrdara*, *stevi* and *kr̥dara* according to Vedas give the meaning of granary or treasure house e.g. ‘*tām ūudaram na pr̥natā yavena*’ ‘as a granary filled with barley’, ‘*nirgā ūpe yavarn iva sthivibhyaḥ*’ as men bring barley from granaries:, ‘*samidho aṅjan kr̥daram matīnām*’ ‘decking the treasure house or prayers’, etc.

In brief, it may be said that the above information gives us a glimpse of Vedic agricultural system and also that since ages, the agriculture has been the base of rural economy because the rural people could maintain their livelihood by engaging themselves in different kinds of agricultural work. Hence, the Vedic agricultural system is the pioneer of the modern agricultural system in Bharath to provide adequate food to each and every people of this country.

After the Vedic period in the great Epics of Mahabharata, Bhagavata and other Epics written by our sages there are descriptions of different important concepts related to the plants, their cultivation, classification, techniques, categorization etc.

Shanti Parva of Mahabharata

In Shanti Parva of Mahabharata, there is a description given by the great sage Veda Vyasa as to why trees are called as पादपाः and also in detail how the trees drink water in the given śloka:

वक्त्रेणोत्पलनालेन यथोर्ध्वं जलमाददेत्।
तथा पवनसंयुक्तः पादैः प्रति पादपाः ॥

As one draws water up with mouth or through a lotus stalk, the plants which are endowed with air pressure drinks with its feet. This also includes the description of osmosis which says that due to rapid evaporation of water from leaves, during transpiration, a tension is created and transmitted to the xylem of the roots, causing the water to cross the cell wall and rise upwards. Osmosis is the spontaneous passage or diffusion of water or other solvents through a semipermeable membrane. This study was mentioned in Mahabharata in 3000 BC, but the world recognizes Wilhelm Pfeffer - a German plant physiologist of 1877 to be the first person who thoroughly studied and described 'Osmosis'.

In another śloka of Shanti Parva, which describes about photosynthesis is:

तेन तज्जलमादत्तं जरयतत्यग्निमा।रुतौ।
आहारपरिणामाच्च स्नेहो वृद्धिश्च जायते॥

The water which is drawn by the roots reacts with अग्नि i.e., sunlight and मरुत् i.e., air and this combination becomes आहारम् i.e., food which makes the tree to prosper. Further Vyasa Bhagavan describes that the trees have sight from the following śloka in Shanti parva:
वल्ली वेष्टयते वृक्षं सर्वतश्चैव गच्छति।
नाप्यदृष्टेश्च मार्गो अस्ति तस्मात् पश्यति पादपाः॥

When we observe the creepers they move about the tree trunks covering it all around. Without sight there is no path for a

living creature. Hence we can say that the creeper can see.

The below śloka from Shanti Parva of Mahabharata describes about the plants that they respond to smell and gases:

पुण्यापुण्यैस्तथा गन्धैर्धूपैश्च विविधैरपि।
अरोगाः पुष्पिताः समिति तस्माज्जिग्रन्ति पादपाः॥

When covered with incense and smoke, the trees become disease free and flower and fructify in plenty. Hence they respond to gasses.

This is the śloka from Shanti parva of Mahabharata describes the hearing ability of the trees.

वाय्वग्न्यानिनिष्पेषैः फलं पुष्पों विशीर्यते।
श्रोत्रेण गृह्यते शब्दस्तेन शृण्वन्ति पादपाः ॥

By the sound of wind, fire and lightning, the fruit and flowers perish. Sound is perceived by ear, hence trees hear. Continuing with the senses of vision, smell and hearing, Shanti Parva of Mahabharata describes the sense of touch of trees by this following śloka:

ऊष्मतो म्लायते वर्णो त्वक्फलं पुष्पमेव वा।
म्लायते शीर्यते चालू स्पर्शस्तेनात्र विद्यते ॥

The Sun rays reduce the colours of barks, leaves and flowers of trees. Hence they also fade and perish due to the heat of the Sun, which proves that the trees have the sense of touch.

Vṛkṣāyurveda

Vṛkṣāyurveda is another important book which gives more details about the flora and the insentient living creatures on the earth. The care and precautions needs to be taken for the protection of plants are also provided in this book. The slokas 271 to 273 describe about the classification of pants which read as follows:

वनस्पतिद्रुमलता गुल्माः पादपजातयः।
 बीजात्काण्डात्तथा कन्दात्तज्जन्म त्रिविधं विदुः ॥
 ते वनस्पतयः प्रोक्ताः विना पुष्पैः फलन्ति ये ।
 द्रुमाश्च ते निगदिताः सहपुष्पैः फलन्ति ये ॥
 प्रसरन्ति प्रतानैर्यास्ता लता परिकीर्तिताः ।
 बहुस्तम्बा विटपिनो ये ते गुल्माः परिकीर्तिताः ॥

The Vṛkṣāyurveda classified plants into four categories:

1. Herbs: These are the plants that bear fruits without flowers i.e., Vanaspati.
2. Trees: Trees are those which bear fruits after flowering. drumaH
3. Creepers: Creepers are the plants that develop tendrils i.e., Latha.
4. Shrubs: The bushy plants with many branches are called shrubs - gulmaH.

Apart from detailed descriptions about plants, Vṛkṣāyurveda also describes the various problems faced by the trees and plants. Here is an example given in the below śloka:

कीटजग्धे अग्निसंप्लुष्टे वातभग्ने अशनिपते।
 वाँक्षच्छेदापचारादि-पीडिते अपि पृथक्क्रिया।
 कीटरोगाण्वादिबाधे अग्निसम्प्लुष्टोक्त
 वाताशनिपाताद्याद्यातेकुठारादिना छेदे च वृक्षस्वरोगः
 भवति।
 एकैकस्यापितदनुसृता चिकित्सा विधेया॥

When eaten by insects, burnt by fire, broken by strong winds, hit by lightning and injured by cuts, trees are affected and those parts are to be separated and should be treated accordingly.

Upavana Vinodam

Another important book that gives more details about plants, their problems and treatment along with the details of cultivating seedless fruits and vegetables is *Upavana Vinodam* which was written during the 13th century A.D.

a) Treatment of trees:

उन्निद्रता मत्स्यसगन्धिता च प्रवालहानिः
 सपिपीलिकत्वम् ।
 त्वग्भ्रानाद् - वारिकृतादजीर्णत तरोर्भवेत्तत्र
 चिकित्सनीयम् ॥

If a tree has symptoms of being always pale, smell of fish, devoid of leaves, full of ants, devoid of bark at some places and inefficiency to digest water, such type of trees require treatment.

b) Tridoshas of trees:

नराणामिव वाँक्षाणां वातपित्तकफाद्गदाः।
 सम्भवन्ति निरूप्यातः कुर्यात्तद्दोषनाशनम् ॥

Trees are like human beings, and are prone to get diseases through the vitiations of vata, pitta and kapha which are considered as three humors that are to be diagnosed and treated to cure; the disease.

c) Kapha natured trees:

The trees of kapha i.e., phlegmatic nature have their branches and leaves glossy, flowers and fruits are well shaped and of good appearance, the trunks are symmetrical and all parts are covered with creepers.

d) Vata natured trees:

Thin and tall, short and shining, not dull with a little vigour and not bearing fruits and flowers, such trees are vata type of trees.

e) Seedless fruits:

When a paste prepared of Madhuyasti, sugar, kushtam, madhupushpam, together applied to the root of a tree, produces seedless fruits.

f) Seedless Vegetables:

If the seeds of ground, brinjal, potato and such other plants are treated with animal fat and then sown in purified ground (i.e., prepared ground and water sprinkled over them) the fruits that grow out of them become big and seedless.

g) Pesticides:

Germes are destroyed by the application of the following substances made into a paste with the urine of cows with vidanga and musta, the bark of karanja, armavadha, arishta and saptaparna.

Krishi Parashara

Krishi Parashara is another book in Sanskrit literature that is completely dedicated to agriculture. The given ślokas gives us the information about the fine time for sowing the seed.

Sowing the seed in vaishaka i.e., during the month of May is stated to be the best, in Jyestha i.e., during the month of June sowing the seeds would yield medium results, in Ashadha i.e., during July the result would be bad and in Shrivana i.e., during August it would be the worst.

It is said that the hot season i.e., from April to May is excellent for sowing seeds and transplantation. Sowing seeds in Shrivanam is said to be bad and in Bhadrpada is said to be the worst.

The end of Jyestha masa and the beginning of Ashadha masa is considered to be the menstruation period and the seeds must not be sown during this period. By following this procedure the farmer would be saved from regret.

Up-gradation and Seed Collection

All sorts of seeds should be procured in Magha or Phalguna i.e., during February or March and should then be dried well in the sun. The seeds should not be sown directly.

Weeding of the field

Even a well grown crop does not yield full returns if grass is not weeded out. The crop from which the grass is weeded out is shravana i.e. August and Bhadrpada i.e. September, doubles its yield later.

Water Retention

A wise farmer constructs small bunds for retaining water during the month of Ashadha i.e. July or Shrivana i.e. August. If such bunds are not constructed, seeds will not germinate. If there is scarcity of rainfall, an attentive farmer constructs such type of bunds in the sun sign of cancer i.e., during the month of June itself. If the construction of bunds is postponed to bhadrpada i.e., September, the crop is reduced to half the quantity. If the same is done in Ashwina i.e. October, there is no scope for returns. At low lands, transplantation and manuring should not be done. Only weeding of grass is to be done.

Draining of water

Water should be drain out from the field in the month of Bhadrpada (September) to keep the crop free from disease. The water which is sufficient only to wet the roots should be retained. But, if the crops are allowed with large quantities of water during the month of Bhadrpada (September), the crops would be damaged by various harmful factors that would deprive the farmer of a good harvest.

Rain Forecast

The ants emerging from the ant hill carrying their eggs and a sudden croaking of frogs are indications of sudden rains. Also, the water birds drying their wings in the hot Sun and crickets chirping in the sky also signify sudden rains.

Management of Agriculture

“Farms yield gold if properly maintained but, the same would lead to poverty if neglected.” These are the words of the great sage Parashara who was well versed in the sacred science of agriculture.

It is also said by the scholars that “the management of one’s harem may be entrusted to one’s father, the management of kitchen can be entrusted to one’s mother, similarly management of cattle can be entrusted to someone equal in status but, farm should never be left to the management of anyone else but to be taken care personally.

In a similar manner, it is said by the sages that Agriculture, cattle, business, women and royal families if left unattended even for a short while, perish within no time.

An agriculturalist always looks after the welfare of his cattle, visits his farm daily, has knowledge of the seasons, is careful about seeds and is industrious is rewarded with the harvest of all kinds and never perishes.

Br̥hat Sam̥hita is another important book in the Sanskrit literature written by great scholar Varāhamihira. The complete work of Varāhamihira can be considered as an encyclopedia for many agricultural concepts and also for understanding various concept of Astrophysics and their relativity to the living creatures on the earth. A comprehensive work on the flora of *Br̥hat Sam̥hitā* is published in this issue of vEda vaaNee (Boddupalli and Boddupalli, 2023). A few concepts are mentioned below:

Grafting

The process of grafting should be done in the spring season (February and March) for

those plants which have not branched and in the rainy season (August -September) for those that have large branches with proper direction. The direction of the tree that is cut off should be kept up in the process of grafting.

Identification of groundwater

In one of the ślokas, Varāhamihira explains that the trees which are short and wise with long hanging branches and glossy leaves indicate the presence of ground water nearby. Whereas trees which are hollow and dry with pale leaves indicate non-existence of ground water nearby. Moreover, if there is an anthill covered by *kusha* grass to the northeast of the mountain-Ebony tree, then there will be inexhaustible water at a depth of 22½ cubits between water and the anthill. Also, the appearance of a snake of the colour of lotus calya at a depth of 5 cubits from a surface level, followed by layers of red earth and ruby, indicate the presence of water

Another indication of underground water according to Varāhamihira is ... if in a grassless place a patch of ground is seen covered with grass or in a grassy plot, a patch is seen devoid of it, a vein of water or treasure is to be declared to exist there.

There are many more such great scriptures like Artshastra, Manusmriti etc., which give us the most valuable knowledge not only in the field of agriculture but all the branches of sciences. In this article, only a few of the ślokas are provided from such great literature.

Conclusion

From the above information, it is evident that right from the Vedic period till date agriculture has always been an integral

part of every civilization. The fact remains that good farming yields a good crop. A good crop not only gives monetary benefits to the farmers but also helps in maintaining the good health of the citizens. Thus, the concept of a healthy mind residing in a healthy body was well followed since ages in Bharath. Because of this perfection in taking care of minutest details with utmost care, Bharath was the most prosperous and developed country which grabbed the attention of many other countries. Most of the countries tried to take with them the knowledge which was the main reason for the prosperity of our country. But they were not successful in doing so, hence they tried to capture Bharath and make it a part of their kingdom. This is the well-known fact because history reveals that Bharath is the only country which has faced many numbers of foreign invasions. Hence, the need of the hour is that we all must understand that all our ancient Bharatiya scholars were always working for the benefit of all living creatures

स्वस्ति प्रजाभ्यः परिपालयन्ताम् ।

न्यायेन मार्गेण महीं महीशाम् ।

गो ब्राह्मणेभ्यः शुभमस्तु नित्यम् ।

लोकाः समस्ताः सुखिनो भवन्तु ॥

“Let the subjects be nourished and governed by the rulers, who follow the path of justice. Let the cattle and the righteous people (ब्राह्मणाः) have goodness and let all the people be happy”.

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5. Ṛgveda I.117.21
6. Ibid. VII.22.6
7. Yajurveda XXIII.45-46
8. Ibid. IV.10
9. Ibid IX.221 also cf. Taittirīya Samhitā VII.1.11.1
10. Taittirīya Samhitā I.2.2.3; VI.1.3.7
11. Ibid. VII.3.12.1
12. Atharvaveda III.12.4
13. Kāthaka Samhitā XXV.4
14. Ibid. II.3
15. Maitrāyaṇī Samhitā II.13.14
16. Ṛgveda I.168.7
17. Śatapatha Brāhmaṇa VII.2.2.12
18. Ṛgveda IV.57.1-3; also cf. Atharvaveda II.8.5; XX.143.8; Taittirīyā Samhitā II.2.1.5
19. Atharvaveda XI.1.28
20. Ṛgveda VI.47.20
21. Mahabharata Shanti Parva 184.13,14,172.12
22. Vrikshayurveda 90,271-273
23. Upavana Vinodam 175,177,179,191,184
24. Sayana-bhashya
25. Krishi-parashara 66,70,79,81,83
26. Brihat-Samhita 54.49, 54.27, 28, 54.52

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Volume of Solids – *Khātavyavahāra* in Sanskrit Texts

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Abstract

Mathematics in ancient India evolved and developed for practical purposes. For Vedic seers performing *Yajñas* (sacrifices) was important and for this purpose, fire altars were to be constructed. Knowledge of the construction of three-dimensional figures helped the seers to raise them. As it was necessary to calculate the cubical content of the ditch to be dug for the basement of the buildings, temples, fire altars etc., the excavations and cubical content of solids (*Khātavyavahāra*) is treated as an individual topic in the mathematical texts of ancient India. The present topic is discussed considering these texts in order. The rules and methods of finding the volume of several three-dimensional solids such as pyramid, frustum, cone, sphere etc. were dealt with in several ancient texts. An attempt is made to bring out these results to the knowledge of the general public.

Key words: Excavations, volume, solids, *khāta*, *upapatti*.

Abbreviations:

Āryabhaṭīya – *Ā*; *Brāhma-Sphuṭa-Siddhānta* – Br.Sp.Si; *Buddhivilāsinī* – BV; *Gaṇita-Sāra-Saṅgraha* – GSS; *Līlāvati* – L

Introduction

The texts like *Śulbasūtras*, *Āryabhaṭīya* (*Ā*) of Āryabhaṭa I, *Brāhma-Sphuṭa-Siddhānta* (*Br.Sp.Si*) of Brahmagupta, *Gaṇita-Sāra-Saṅgraha* (*GSS*) of Mahāvīra, *Līlāvati* (*L*) of Bhāskara II and many other texts deal with the calculation of volume of the solids and the excavations, which are considered here for discussions. *Śulbasūtras* give measures and constructions of several three-dimensional fire-altars, bricks etc. for which an example is given here. In *Āryabhaṭīya* (*Ā*), the approximate volume of a right pyramid and a sphere is given. Brahmagupta gave the correct formulae for regular and non-uniform solids and also for a frustum. Vīrasena has mentioned

a rule for the volume of a trapezoidal solid. Śrīdhara has given an expression for the volume of the frustum of a cone and an approximate formula for the volume of a sphere. Mahāvīra gives a rule for arriving at the cubical contents of excavations and also for one having in the middle a tapering projection, volumes of frustum-like solids, sphere (approximate) and for a triangular pyramid. Bhāskara II gives the volume of an irregular ditch, volume of a pyramid and its frustum, volumes of a ditch with square or circular base, a cone and a sphere. Gaṇeśa Daivajña and Jyeṣṭhadeva later provided *upapattis* (demonstrations/proofs) for the rules of Bhāskara.

1. Śulbasūtras

Śulbasūtras (earlier than 800 BC) are the earliest Indian texts available at present that contain mathematical content. *Śulbasūtrakāras* were familiar with the concept of volume since they used to fix the height as well as the number of layers and total number of bricks in the fire altars of regular geometrical shape. For example, the construction of *śmaśānaciti* (pyre) is explained in *Baudhāyana-Śulbasūtras* (III. 253–269).

श्मशानचितं चिन्वितेति विज्ञायते ।
...ताभिश्चतस्रो वा नव वा चतुर्दश वा
चितिरुपाधाय शेषमवाञ्चमक्षयापच्छिन्द्यात् ।
अर्धमुद्धारेत् ॥ तस्य नित्यो विभागो
यथायोगमिष्टकानां हासवृद्धिः ॥

“According to tradition, a fire-altar in the form of a *śmaśānaciti* is to be constructed ... With the bricks, 4 or 9 or 14 layers are made, the remaining layer is diagonally cut in the downward directions and half of it removed. Its division is exact. Larger and smaller bricks are taken according as these fit (1; pp.35-6, 97-8)”.

The interpretation of this is as follows: The above *sutras* enjoin that the *śmaśānaciti* fireplace should have a base of an isosceles trapezium and its top surface should slope from one edge (eastern) to the other (western) so that its eastern height is up to the neck and the western height is up to the navel; yet the volume of the fire-place is to be the same as that of the usual fire-place. Datta [2; p.103] gave a modern representation that this construction is based on the approximate formula for the frustum of a pyramid namely,

$V = \{(a + a')/2\} \{(b + b')/2\}h$, where (a, b) and (a', b') are the dimensions of the lower and upper faces.

2. Āryabhaṭa I

“Half of that area (of the triangular base) multiplied by the height is the volume of a six-edged solid [3; p.39].”

Area of six-edged solid = $\frac{1}{2} \times$ area of base triangle \times height of the solid.

(b) Āryabhaṭa gives formulae for the area of a circle and approximate volume of a sphere (\bar{A} . II.7.):

समपरिणाहस्यार्धं विष्कम्भार्धहतमेव वृत्तफलम् ।
तन्निजमूलेन हतं घनगोलफलं निरवशेषम् ॥

“Half of the circumference, multiplied by the semi-diameter certainly gives the area of a circle. That area (of the section through diameter) multiplied by its own square root gives the volume of the sphere [3; p.40]”.

The formulae that are given here:

$$\text{Area of a circle} = (C/2) (d/2)$$

$$\text{Volume of sphere} = (C/2) (d/2) \sqrt{\frac{C}{2} \times \frac{d}{2}}$$

$$\Rightarrow = \pi r^2 \sqrt{\pi r^2} \text{ (where } d = 2r \text{ i.e. diameter = twice the radius)}$$

$$= \sqrt{\pi} \pi r^3$$

Note: The formulae for the six-edged solid and the volume of the sphere given in \bar{A} are approximate and these are upgraded and perfected by the later mathematicians.

3. Brahmagupta

Brahmagupta, the most celebrated mathematician belonging to the School of Ujjain, wrote his *Brāhma-Sphuṭa-Siddhānta* (*Br.Sp.Si.*) in 629 CE. This is also a book on

astronomy, but chapters XII and XVIII are on mathematics.

(a) He has given the accurate formula for the volume of a pyramid (*Br.Sp.Si.XII.44*):

क्षेत्रफलं वेधगुणं समखातफलं हतं त्रिभिः सूच्याः।

मुखतलतुल्यभुजैक्यान्येकाग्रहतानि समरञ्जः॥

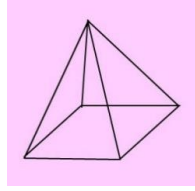


Fig. 1: Pyramid

“The volume of a pit of uniform depth is area of *samakhāta* multiplied by the depth. This divided by three is the volume of a *sūcī*, a figure tapering to a point. In an excavation having the same breadth at the face and bottom, the aggregates (of the partial products of lengths and depths) divided by the total (length) will be the mean measure (*samarajju*) of the depth [6; pp.135-36].”

The following formulae are given in this verse:

- The volume of a pit of uniform depth = area of section \times depth
- The volume of a solid which tapers uniformly = $(1/3)$ area of base to a point *i.e.* that of a cone (*sūcī*) \times depth
- The volume of a pyramid = $(1/3) \times$ the volume of a prism on the same base
- When a pit has non-uniform depth, this is divided into parallel strips of uniform depth. The product of the breadths when divided by the sum of the widths of these strips is the *samarajju* (average depth).

(b) The volume of a frustum is given for the first time by Brahma Gupta (*Br.Sp.Si.XII.45, 46*) [7]:

मुखतलयुतिदलगुणितं वेधगुणं व्यावहारिकं गणितम्।

मुखतलगणितैक्यार्धं वेधगुणं स्यात् गणितमौत्रम्॥

औत्रगणिताद्विशोध्य व्यवहारफलं भवेत्त्रिभिः शेषम्।

लब्धं व्यवहारफले प्रक्षिप्य भवति फलं सूक्ष्मम्॥

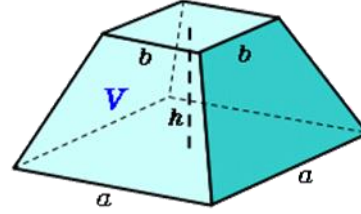


Fig. 2: Frustum

“The square of half the sum of the sides in the face and the base multiplied by the depth is the *Vyavahārika* volume. Half the sum of the areas of the face and base multiplied by the depth is the *Autra* volume. The *Vyavahārika* volume (V_v) is subtracted from the *Autra* volume (V_a) and being divided by three; this quotient is added to the *Vyavahārika* volume. This gives the exact volume (V) [6]”.

This can be expressed in modern notation as follows:

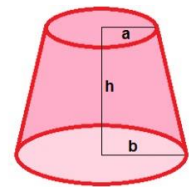
$$V = V_v + (1/3) (V_a - V_v)$$

$$= \{(a + b)/2\}^2 \times h + [\{(a^2 + b^2)/2\} - \{(a + b)/2\}^2] (h/3)$$

$$= (h/3) (a^2 + b^2 + ab)$$

4. Vīrasena

Vīrasena (710 – 790 CE) has written a commentary on the *Śaṭkhaṇḍāgama*, [8] called *Dhavalā*. In this work he



has quoted an old *Karaṇagātha*, for the volume of a trapezoidal solid:

मुखतलसमासार्द्ध उत्सेधगुणं च
वेधेन।

घनगणितं जानीयात् वेत्रासनसंस्थिते
क्षेत्रे॥

“Half the sum of the face and the base multiplied by the height and by the depth is to be known as the volume of a figure resembling a rattan seat”.

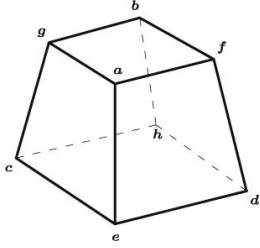


Fig. 3: Trapezoid

The volume of a trapezoidal solid = Area of the trapezium × thickness
= (1/2) (face + base) × height × depth

Vīrasena details a method of infinite division for finding the volume of the frustum of a cone in his *Dhavalā*. If a and b are the diameters at the base and at the top and h , the height of the frustum, the volume of the frustum is
= $(\pi \cdot h/4) (1/3) (a^2 - ab + b^2)$

5. Śrīdhara

(a) Śrīdhara (8th century CE) has written several works in astronomy and mathematics. Among them *Siddhāntaśekhara*, *Pāṭīgaṇita* and *Trirāsikā* are well-known. Śrīdhara has given an expression for the volume of the frustum of a cone (*Trīśatikā*, Rule 38).



Fig. 4: Frustum

मुखतलतद्योगानां वर्गेक्यकृतेः पदं दशगुणायाः।
वेधगुणं चतुरन्वितविंशतिभक्तं फलं कूपे॥

“The square of the diameter of the base, the square of diameter of face and square of sum of these two diameters, these three squares are added and this sum is squared, this is multiplied by ten. Take square-root of this result. Multiply this by the height and divide by 24. This gives the volume of the frustum of a cone [9; pp.202-03].”

Representing this in the modern notation :

$$V = \frac{h}{24} \sqrt{10 \{a^2 + b^2 + (a + b)^2\}^2}$$

$$V = \frac{\pi h}{24} \sqrt{\{a^2 + b^2 + (a + b)^2\}^2} \quad (\text{taking } \sqrt{10} = \pi)$$

Where for the frustum, ‘ h ’ is the height and ‘ a , b ’ are the diameters of the base and the top.

(b) Śrīdhara’s formula for the approximate volume of a sphere is as follows (*Trīśatikā*.56):

गोलव्यासघनार्धं स्वाष्टादशभागसंयुतं
गणितम्॥

“Half the cube of the diameter of the sphere added to one-eighteenth of itself gives the volume of the sphere”.

Śrīdhara’s formula for the Volume of a sphere
= $(d^3/2) + d^3/(2 \times 18) = (19/36) d^3$

6. Mahāvīrācārya

Mahāvīra was a *Digambara* Jain, who lived during the reign of a Rāṣṭrakūṭa king called, Amoghavarṣa. Mahāvīrācārya wrote his *Gaṇita-Sāra-Saṅgraha* (GSS) in 850 AD. This is regarded as a proper book containing rules and many examples. This represents the

mathematics prevailed at that time and it is studied for a long time, especially by the Jains. This work treats *Khāta-vyavahāra* as a separate topic.

(a) Mahāvīra gives a rule for arriving at the cubical contents of excavations (GSS.VII.4):

क्षेत्रफलं वेधगुणं समखाते व्यावहारिकं
गणितम्।

मुखतलयुतिदलमथ सत्संख्यासं
स्यात्समीकरणम्॥

“The approximate measure of the cubical contents in a regular excavation is equal to the product of the area of base and depth. When the excavation is not uniform, it is separated into several units. The sums of the average of top and bottom dimensions are halved; then their sum is divided by the number of the said halved quantities. Such is the process of arriving at the average equivalent value [10; p.258]”.

(b) *Gaṇita-Sāra-Saṅgraha* gives a rule for finding the volume of frustum-like solid in $3\frac{1}{2}$ verses (GSS.VIII.9-11½):

बाह्याभ्यन्तरसंस्थिततत्क्षेत्रस्थबाहुकोटिभुवः।

स्वप्रतिबाहुसमेता भक्तास्तत्क्षेत्रगणनयान्योन्यम्॥

गुणिताश्च वेधगुणिताः कर्मान्तिकसंज्ञगणितं
स्यात्।

तद्बाह्यान्तरसंस्थिततत्क्षेत्रे फलं समानीय॥

संयोज्य सङ्ख्यासं क्षेत्राणां वेधगुणितं च।

औण्ड्रफलं तत्फलयोर्विशेषकस्य त्रिभागेन॥

ससंयुक्तं कर्मान्तिकफलमेव हि भवति
सूक्ष्मफलम्॥

The interpretation of the rules as following:

According to Gupta [11], this rule is a sort of generalization of a similar rule given by Brahmagupta.

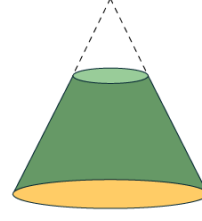


Fig. 5: Frustum

The rule is expressed here in mathematical symbols. Let the number of sections considered be ‘ n ’ and $f(a, b, c, \dots)$ denote the area of a section as a function of its defining (independent) linear dimensions a, b, c, \dots . Let $a_1, b_1, c_1, \dots; a_2, b_2, c_2, \dots; \dots a_n, b_n, c_n, \dots$ be these linear dimensions (or sides) of the ‘ n ’ sections. Then the *Karmāntika* (Practical) volume (K) will be

$K = h \cdot f(\bar{a}, \bar{b}, \bar{c}, \dots)$, where h is the depth of the excavation and

$$\bar{a} = (a_1 + a_2 + \dots + a_n) \div n. \text{ etc.}$$

The *auṇḍra* (gross) volume = $A = h (A_1 + A_2 + \dots + A_n) \div n$. where $A_1 = f(a_1, b_1, c_1, \dots)$ etc. are the areas of ‘ n ’ sections. Then, according to the above rule, the accurate volume is given as

$$V = K + \frac{A-K}{3} = (2K + A)/3$$

Here the exact volume of the solid is obtained when the sections are circles, squares etc. the corresponding sides in various sections being parallel to each other in all the polyhedrons. If we consider only the two extreme sections (the top and the base), then ‘ n ’ will be two and the rule is same as the one given by Brahmagupta.

(c) Mahāvīra gives a rule (GSS.VII.19½ - 20½) for arriving at the value of the cubical content of an excavation having in the middle (of it) a tapering projection.

परिखामुखेन सहितो
विष्कम्भस्त्रिभुजवृत्तयोस्त्रिगुणात्।
आयामश्चतुरश्रे चतुर्गुणो व्याससङ्गणितः॥
सूचीमुखवद्वेधे परिखा मध्ये तु परिखार्धम्।
मुखसंहितमथो करणं प्राग्वत्तलसूचिवेधे च॥

“The breadth (of the central mass) increased by the top-breadth of the surrounding ditch, then multiplied by three, gives rise to the value of the (required) perimeter in the case of triangular and circular excavations. In the case of a quadrilateral excavation (this same value of the perimeter results) by multiplying four and breadth [10; pp.261-62]”.

If ‘d’ is the breadth of the central figure, ‘b’ is the breadth and ‘h’ is the depth of the ditch, then, length of the equilateral triangular or circular ditch = (d + b) × 3

Karmāntika phala = K = (d + b/2)(3) × (b/2)

Aunḍra phala = A = (d + b)(3) × (b/2)

Sūkṣma phala = S = K + $\frac{A-K}{3}$

Cubical content = V = { K + $\frac{A-K}{3}$ } × depth

(d) Mahāvīra’s rule for arriving at the volume of a sphere is as follows (GSS.VII.28½):

व्यासार्धघनार्धगुणा नव गोलव्यावहारिकं
गणितम्।

तद्दशमांशं नवगुणमशेषसूक्ष्मं फलं भवति॥

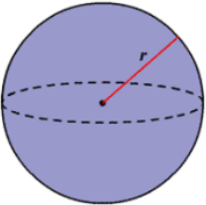


Fig. 6: Sphere

“The half of the cube of half the diameter, multiplied by nine, gives the approximate value of the cubical contents of a sphere. This (approximate value), multiplied by nine and

divided by ten, on neglecting the remainder, gives rise to accurate value of the cubical measure [10; p.265]”.

The diameter of the sphere = d

Approximate volume of the sphere =
(1/2) (d/2)³ × 9 = (9/2) r³

Accurate volume of the sphere =
(9/2) r³ × (9/10)

Note: This formula is not accurate as claimed by GSS.

(e) Mahāvīra has given a rule for arriving at the volume of an excavation in the form of a triangular pyramid (GSS.VII.30½):

भुजकृतिदलघनगुणदशपदनवहृद्व्यावहारिकं
गणितम्।

त्रिगुणं

दशपदभक्तं

शृङ्गाठकसूक्ष्मघनगणितम्॥

“The cube of half the square of the side (of the basal equilateral triangle) is multiplied by ten; and the square root (of the resulting product is) divided by nine. This gives rise to the approximately calculated value. This value when multiplied by three and divided by the square root of ten, gives rise to the accurately calculated cubical contents of the pyramidal excavation [10; pp.265-66]”.

For the pyramidal excavation having base as equilateral triangle:

Approximate volume = $\sqrt{\left(\frac{a^2}{2}\right)^3 \times 10 \left(\frac{1}{9}\right)}$

Accurate volume = $\frac{a^3}{18} \times \sqrt{5} \times \frac{3}{\sqrt{10}}$
= $a^3 \times \frac{\sqrt{2}}{12}$



Fig. 7: Pyramid

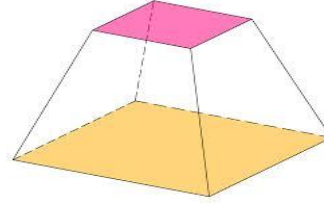


Fig. 8: Frustum

7. Bhāskarācārya II

The popular name in the history of ancient and medieval Indian astronomy and mathematics is that of Bhāskarācārya (1114 – 1193 CE). His *Siddhānta-Śiromaṇi* is studied by scholars of traditional Indian mathematics. He has perfected many of the formulae given by his ancestors. Bhāskara II treats *Khātavyavahāra* in his *Līlāvātī* as a separate topic.

(a) Bhāskara II gives the volume of an irregular ditch in *L.214*:

गणयित्वा विस्तारं बहुषु स्थानेषु
तद्युतिर्भाज्या।

स्थानकमित्या सममितिरेवं दैर्घ्यं च वेधे
च॥

क्षेत्रफलं वेधगुणं खाते घनहस्तसंख्या
स्यात्॥

“In an irregular ditch, measure the breadth at various points, add them and divide by the number of points. This is the average breadth. Similarly, calculate the average length and depth. The product of the three averages will give the volume [12; p.151]”.

(b) To find the volume of a pyramid and its frustum, a rule is given (*L.217*):

मुखजतलजतद्युतिजक्षेत्रफलैक्यं हतं
षड्भिः।

क्षेत्रफलं सममेवं वेधहतं घनफलं स्पष्टम्॥
समखातफलत्र्यंशः सूचीखाते फलं भवति॥

Sum of the areas of top and bottom faces and that of the rectangle which has the sum of their sides as sides, divided by six gives the average area; this multiplied by depth is the (average) volume. One-third of the volume of a regular equal solid becomes the volume of pyramid.

(c) An *upapatti* is given in *Buddhivilāsini*, a commentary on *Līlāvātī* by Gaṇeśa Daivajña [*BV. p.223*] for the above rule using the example in *L. 218*:

मुखे दशद्वादशहस्ततुल्यं
विस्तारदैर्घ्यं तु तले तदर्धम्।
यस्याः सखे सप्तकरश्च वेधः

का खातसंख्या वद तत्र वाप्याम्॥

“Tell the quantity of the excavation in a tank, of which the length and breadth are equal to twelve and ten cubits at its mouth, and half as much at the bottom, and of which the depth, friend, is seven cubits [13; p.151]”.

Gaṇeśa Daivajña in his *Buddhivilāsini* (*BV*) [14], explains by providing an interpretation similar to what is done today in the engineering drawing:

अत्रोपपत्तिः। तत्र मुखे दश द्वादशेति
वक्ष्यमाणखातस्य निदर्शनम्। अत्र
तलक्षेत्रानुसारिणः सप्तवेधस्य समखातस्य
घनफलं २१०। अवशिष्टखातस्य कोणेषु चत्वारि
सूचीखातखण्डानि एवमष्टौ। तथा पूर्वादिदिक्षु

चत्वारि। दर्शनम्। कोणस्थखण्डचतुष्टययोगेन जातं सप्तवेधं सूचीखातदर्शनम्- तस्यास्य सूचीखातस्य घनफलं ७०। तथा दिक्षु स्थितखण्डचतुष्टयमध्ये द्वयोर्द्वयोरन्योन्याभिः मुखयोर्योगेन जातं सप्तवेधं समखातद्वयम्। तयोर्दर्शनम् । अनयोर्घनपले १०५।१०५। एवं चतुर्णामेषां २१०। ७०। १०५। १०५ योगेन जातं सर्वखातस्य फलं ४९०। मुखजतलजतद्युतिजेत्यादिक्रियया समं दृश्यत इति। यद्वा सामान्येनान्यथोच्यते। मुखजतलजविस्तारयोर्योगार्धं मध्यवर्ति- विस्तारः। एवं दैर्घ्ये च। तयोर्घातो मध्यफलम्। अत्रार्धेनार्धं गुणितं चतुर्थांशः स्यादिति विस्तारयोगदैर्घ्ययोगयोर्घात-श्चतुर्गुणं मध्यफलं स्यात्। तथा मुखजं फलमेकगुणं तथा तलजमेकगुणमेषां त्रयाणां योगः षड्गुणं समफलं स्यात्। अत उक्तं मुखजतलजेत्यादि।

Here is the *Upapatti*: “An excavation having 10 and 12 as the dimensions of the face is considered. [The corresponding sides of the base are 5 and 6]. According to this base, with depth 7, the cubical content (volume) of the uniform excavation [having base and face of dimensions 5 × 6, a rectangular parallelepiped] is 210. In the remaining excavation, in the corners there are four parts in the form of needle-shaped portions of excavations (*sūcī-khāta*) and there are four in the directions of east etc, thus there are eight parts (Fig. 10). The volume of four parts (triangular prisms) in the corners with depth 7 is 70. Similarly, among the four parts standing in the four directions, both the sides facing each other being added we get two uniform solids of depth 7. Their volumes are 105 and 105. By

adding the four volumes 210, 70, 105 and 105 the volume of the full excavation is obtained as 490. Thus the rule ‘*Mukhajatalaja...*’ (L. 217) is applied. It is also stated the other way. Half of the sum of the breadths of face and base is the breadth of the middle one. In the same way length is found. The product of these is the average area. Here half multiplied by half will become one fourth and so 4 times the product of the sum of the breadths and the sum of the lengths is cubical content of middle parts (*madhyaphalam*). The sum of the three volumes produced by face, base and *madhyaphalam* is six times the cubical content of the excavation”.

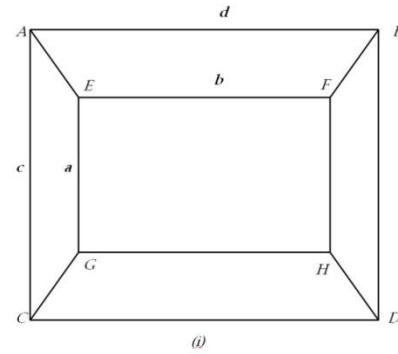


Fig. 9: Frustum

Volume (V) of a frustum with similar rectangular faces of sides, (a,b) and (c,d); depth ‘h’ is given in L. 217 by

$$V = \{ ab + cd + (a + c)(b + d) \} (h/6)$$

The *upapatti* can be explained as follows:

- i. In the middle, there is a parallelepiped with sides 5, 6 and depth 7. [Shown below in Fig. 10. (i)]. Its volume = $5 \times 6 \times 7 = 210$.
- ii. 2 *sūcī-khātas* on the side 5 each with volume $7 \times \frac{5}{2} \times \frac{12-6}{2} = \frac{105}{2}$. [Shown below in Fig. 10 (ii)]

- iii. 2 *sūcī-khātas* on the side 6 each with volume $= 7 \times \frac{6}{2} \times \frac{10-5}{2} = \frac{105}{2}$ [shown in Fig. 10 (iii)]. Two such sections together make a parallelepiped; so each is half the volume of a parallelepiped.
- iv. 4 rectangular pyramids, each with volume $= \frac{7}{3} \times \frac{12-6}{2} \times \frac{10-5}{2} = \frac{35}{2}$. [Shown in Fig.10 (iv) below]. Three such sections together make a parallelepiped; so each is one-third of the volume.

Fig. 10:

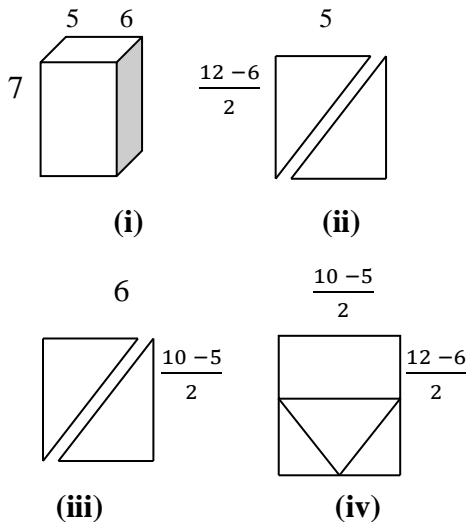


Fig. 10a (ii):

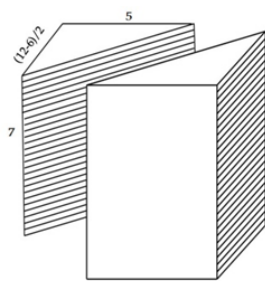


Fig. 10a (iii):

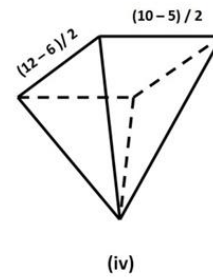
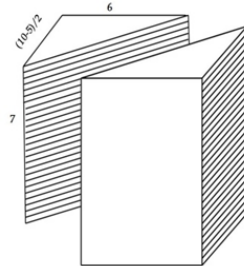


Fig. 10a (iv)

Total volume = $210 + 2 \times \frac{105}{2} + 2 \times \frac{105}{2} + 4 \times \frac{35}{2} = 490$

BV says (a) A rectangular cuboid of sides $a = 5$ and $b = 6$ and depth $h = 7$ units inserted in a frustum with bottom base as $a \times b = 5 \times 6$ and top face $c \times d = 10 \times 12$ and depth 7 units. (b) Four triangular prisms on the 4 vertical faces of the box. (c) Four rectangular pyramids at the 4 corners of the top face of the box.

The sum of the following volumes is the volume of the frustum:

- (a) Volume of rectangular box, $V_1 = abh$
- (b) Volume of 4 triangular prisms, $V_2 = 2 \cdot \frac{a}{2} \cdot \frac{d-b}{2} \cdot h + 2 \cdot \frac{b}{2} \cdot \frac{c-a}{2} \cdot h$
- (c) Volume of 4 rectangular pyramids, $V_3 = 4 \cdot \frac{c-a}{2} \cdot \frac{d-b}{2} \cdot \frac{h}{3}$

Adding the 3 volumes

$$\begin{aligned}
 V &= V_1 + V_2 + V_3 = abh + 2 \cdot \frac{a}{2} \cdot \frac{d-b}{2} \cdot h + 2 \cdot \frac{b}{2} \cdot \frac{c-a}{2} \cdot h + 4 \cdot \frac{c-a}{2} \cdot \frac{d-b}{2} \cdot \frac{h}{3} \\
 &= h \left(\frac{ad}{6} + \frac{bc}{6} + \frac{cd}{3} + \frac{ab}{3} \right) \\
 &= \frac{h}{6} (ab + cd + ad + ab + bc + cd) \\
 &= \frac{h}{6} \{ ab + cd + (a + c)(b + d) \}
 \end{aligned}$$

The volume required in the example (L. 218) is

$$\frac{7}{6} \{ 5 \times 6 + 10 \times 12 + (5 + 10)(6 + 12) \} = \frac{1}{6} \times 2940 = 490.$$

The volume (V) of a frustum with similar rectangular faces of sides, 'a,b' and 'c,d'; depth 'h' is given by

$V = \{ab + cd + (a + c)(b + d)\} (h/6)$. Volume of a pyramid is one-third of a prism with the same base and same height.

Note: Figures 10 and 10a above, as given in *Buddhivilāsinī*, give the vertical cross-section of the excavation as looked from top and the horizontal cross section. In modern Engineering drawing these are said to be 'Plan and Elevation.'

(d) To find the volume of a ditch with square or circular base a rule is given (L.219a):

उच्छ्रयेण गुणितं चितेः किल क्षेत्रसंभवफलं घनं भवेत्।

'Volume of a prism is equal to the product of the area of its base and height.'

To find the volume of a heap of grain i.e. volume of a cone is given in L.227b:

भवति परिधिषष्ठे वर्गिते वेधनिघ्ने।

घनगणितकराः स्युर्मागधास्ताश्च खार्यः॥

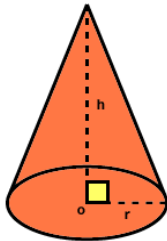


Fig. 11: Cone

"A sixth of the circumference being squared and multiplied by the depth (height). The

product will be the solid cubits, and they are *khārīs* of Magadha [13; p.156]".

Volume of a cone

$$\begin{aligned} &= \text{height} \times (\text{circumference}/6)^2 \\ &= h \times (2\pi r/6)^2 = (\pi^2 r^2 h) / 3^2 \\ &= (1/3) \pi r^2 h \quad \{\text{taking } \pi = 3\} \end{aligned}$$

(e) A rule to find the volume of a sphere is given in L.201c, d:

गोलस्यैवं तदपि च फलं पृष्ठजं व्यासनिघ्नम्।
षड्भिर्भक्तं भवति नियतं गोलगर्भे घनाख्यम्॥

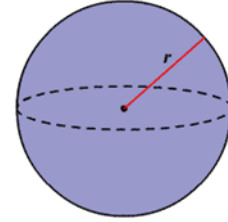


Fig. 12: Sphere

"This content of the surface of the sphere, multiplied by the diameter and divided by six is the precise solid, termed cubic, content within the sphere [13; p.136]".

The volume of a sphere = Surface area of sphere $\times d/6$

Surface area is = $4 \times \text{circumference} \times d/4$

\Rightarrow The volume of sphere

$$\begin{aligned} &= 4 \times C \times (d/4)(d/6) \\ &= 4 \times 2\pi r \times (1/4) 2 r \times (2 r/6) \end{aligned}$$

{in present day notation}

$$= (4/3)\pi r^3$$

Note: Bhāskara II has given the perfect formulae for the volume of the solids i.e. the cubical content of the excavations, compared to the earlier mathematicians.

Gaṇeśa gives *upapatti* [15; p.201] for the volume of a sphere for the rule given in L.201 c, d:

अथ घनफलोपपत्तिः- गोलस्य
 व्यासार्धतुल्यदैर्घ्याणि सूच्याकाराणि सूच्यग्राणि
 चतुष्कोणदैर्घ्याणि मूर्ध्नि
 हस्ततुल्यविस्तृतिदैर्घ्याणि कृतानि खण्डानि
 पृष्ठफलसंख्यान्येव भवन्ति।
 एवंविधैकखण्डस्य मूर्ध्नि क्षेत्रफलं रूपमेव।
 खण्डदैर्घ्यं व्यासार्धं स एव वेधः। तेन गुणितं
 क्षेत्रफलं तस्य त्रयंशो घनफलं स्यात्। क्षेत्रफलं
 वेधगुणं खाते घनहस्तसंख्या स्यात्।
 समखातफलत्रयंशः सूचीखाते फलं भवतीति
 वक्ष्यमाणत्वात्। अतो व्यासषडंश एवैकखण्डस्य
 घनफलं स्यात्। तत्पृष्ठफलगुणितं सर्वगोलस्य
 घनफलं जायत इति। अत उक्तं - तदपि च
 फलं पृष्ठजमित्यादि॥

“Then the [14] *upapatti* for cubical content - Needle-shaped pointed sections (pyramids), which have length equal to half the diameter of the sphere and which have on top, squares that have length and width equal to one *hasta* (unit length), are made and the number of such sections are equal to the surface area. The area on top of such a section is one (square unit) itself. The length of a section is half the diameter, that itself is depth. One-third of the area multiplied with that will be the cubical content, as it will be said that ‘the area multiplied by the depth will be the number of cubical *hastas* of an excavation’ (L.214 ef) and that ‘one-third of the (cubical) content of a regular excavation is the (cubical) content of a needle-shaped excavation’ (L.217 ef). Therefore one sixth of diameter only is the cubical content of one section. That multiplied

by the surface area becomes the cubical content of the full sphere. Hence it is said – ‘This surface area also...’ (L. 201 cd)”.

This is explained: The whole surface area of the sphere is divided into unit squares. Thus there are S (equal to surface area) unit squares. Corresponding to each unit square, one needle-shaped section (*sūcyagra*) is made. The base surface of each needle-shaped section is a square of unit length *i.e.* its area is one unit square. This has depth equal to half of the diameter.

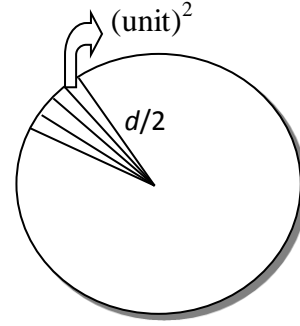


Fig. 13: Volume of sphere

The volume of 1 needle-shaped section
 = base area \times depth \times 1/3
 = 1 unit square \times (d/2) \times (1/3)

The volume of ‘ S ’ needle-shaped sections
 = $S \times (d/6)$

This can be expressed in modern notation as =
 $4 \pi r^2 \times (2 r/6)$
 = $(4 \pi r^3 /3)$ cubic units

Note: Here the sphere is divided into small units and then their sum is taken to find the volume. Here we see the rudiments of Calculus.

Yuktibhāṣā of Jyeṣṭhadeva (1500 – 1610 CE) derives the expressions for the formulae for volume of a sphere etc. with the help of the methods of Calculus, which were discovered

in Europe later by Newton and Leibnitz (17th-18th CE).

The derivation of the volume of a sphere as in *Gaṇita-yukti-bhāṣā* [16; pp.264-66], is as follows:

Let r be the radius of the sphere and C , the circumference of a great circle.

$$\text{Area of circle} = (1/2) C \times r \quad (1)$$

The half-chord B_j is the radius of the j^{th} slice into which the sphere has been divided. The corresponding circumference is $\left(\frac{C}{r}\right)B_j$ and from (1), the area of this circular slice is $= \frac{1}{2} \left(\frac{C}{r}\right)B_j^2$

If Δ is the thickness of the slices, then the volume of the j^{th} slice is $= \frac{1}{2} \left(\frac{C}{r}\right)B_j^2 \Delta$

Volume of a sphere = the sum of the squares of the Rsines B_j^2

$$V \approx \frac{1}{2} \left(\frac{C}{r}\right) [B_1^2 + B_2^2 + \dots + B_n^2] \Delta \quad (2)$$

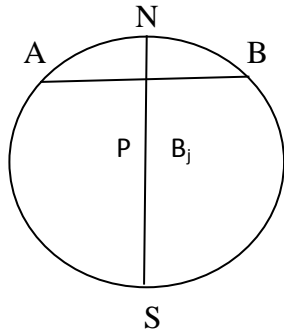


Fig. 14: Square of half-chord equal to product of *śaras*

In the Fig. 14, $AP = PB = B_j = j^{\text{th}}$ half-chord, starting from N , the north point.

$$B_j^2 = AP \times PB = NP \times SP \quad (\text{by } \bar{A}ryabha\bar{t}i\bar{y}a \text{ rule, Gaṇita. 17})$$

$$= \frac{1}{2} [(NP + SP)^2 - (NP^2 + SP^2)]$$

$$= \frac{1}{2} [(2R)^2 - (NP^2 + SP^2)] \quad (3)$$

If $\Delta = \frac{2r}{n}$, be the thickness of each slice, the j^{th} R versine $NP = j \Delta$ and its complement $SP = (n - j) \Delta$. Hence, while summing the squares of the Rsines B_j^2 , both NP^2 and SP^2 add to the same result. Thus by (2) and (3)

$$V \approx \frac{1}{2} \left(\frac{C}{r}\right) \left(\frac{2r}{n}\right) \left(\frac{1}{2}\right) [(2r)^2 + (2r)^2 \dots + (2r)^2] - \left[\frac{1}{2} \left(\frac{C}{r}\right) \left(\frac{2r}{n}\right) \left(\frac{1}{2}\right) \left(\frac{2r}{n}\right) (2) [(1)^2 + (2)^2 \dots + (n)^2]\right] \quad (4)$$

For large n , the sum of the squares (*varga-saṅkalita*) is essentially one-third the cube of the number of terms. Then (4) becomes

$$V = \left(\frac{C}{2r}\right) \left(4r^3 - \frac{8r^3}{3}\right) = \left(\frac{C}{6}\right) d^2$$

Hence the Volume of sphere = one-sixth of circumference \times square of diameter, which is same as $V = \frac{4}{3} \pi r^3$

This is the proof given by *Gaṇita-yukti-bhāṣā* for the rule L.201 cd.

Conclusion

The *Khāta-vyavahāra* or the excavations and cubical content of solids, is treated as a separate topic by the mathematicians in the ancient Indian texts starting from *Śulbasūtras*, *Āryabhaṭīya*, and so on up to *Līlāvātī* of 12th century CE. The important rules of *Khāta-vyavahāra*, which are dealt with by the ancient scholars have been discussed here. *Āryabhaṭa II*, *Nemicandra*, *Śrīpati* and *Nārāyaṇa Paṇḍita* mostly repeat the earlier mathematicians' rules. The formulae for prisms, pyramids, frustum, cone and sphere have evolved from approximate calculations

up to accurate formulae, which are used even today. These formulae for finding the volume are used in the construction of temples and buildings and are used at present, by the *sthapatis*, who follow the traditional methods. Calculating the earth taken from an excavation or pit, that is going to be dug, helps to plan the use of the earth or mud dug such as whether that can be used to build an embankment, build a platform, fill up some other pit or use it for the other constructions.

In the Times of India (Kolkata, August 17, 2014, p.10), there appeared an interview with Manjul Bhargava FRS, who was awarded the Fields Medal in 2014.

- When asked: Why is India still a middle power in mathematics despite its famed legacy? Manjul in his reply said:

‘Students in India should be taught about the great ancient Indian legacy of mathematicians, since ancient times, like Panini, Pingala, Hemachandra, Aryabhata, Bhaskara, Brahmagupta, Madhava for example and more recently Ramanujan etc. Their stories and works inspired me, and I think they would inspire students across India. Many of these works were written in Indian languages in beautiful poetry, with a flavour of Indian stories and contain some of the most important breakthroughs in the history of mathematics.’

The above statement of Manjul Bhargava reveals the importance and relevance of ancient Indian mathematics in the Sanskrit texts and how the study of these texts can create enthusiasm among young students and influence them for research. In this topic especially the study of three-dimensional solids and the beginning of calculus are appealing to the students.

Future work: Only a few books have been edited from manuscripts and translated so far. If more works from the vast repository of manuscripts are edited and published, then more of the hidden wisdom will come to light. This ancient knowledge of Indian mathematicians is to be imparted to young children.

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Relevance of Astrology in Ayurveda

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Abstract

Astrology is one of the Six *Vedangas*, which came as Smruthi from sages/saints/seers over the ages as part of the Sanatana Dharma. Ayurveda is composed of two words, *āyu*, “life” or “longevity”, and Veda, “knowledge”, translated as “knowledge of longevity or “knowledge of life and longevity”. Ayurveda emanated from Vedas as Sruthi. Ayurveda is part of Atharvaveda. In this article, an attempt has been made to co-relate and to bring integration between both the Veda and Vedanga, namely, Ayurveva (Atharvaveda) and Astrology (*Vedanga*) – denoting as Medical Astrology.

Introduction

Astrology and Ayurveda are two ancient practices that have been intertwined for centuries, offering a holistic approach to health and well-being. The astrology explores the influence of celestial bodies on human lives and whereas the Ayurveda focuses on balancing the body, mind, and spirit through natural remedies and lifestyle practices.

Astrology is an ancient system that studies the positions and movements of celestial bodies to gain insights into the human experience. It believes that the alignment of the stars and planets at the time of our birth can shape our personality traits, strengths, weaknesses, and life events. Astrology provides a roadmap for self-discovery and understanding, helping individuals make informed decisions to improve their overall well-being.

Ayurveda, meaning ‘the science of life’ in Sanskrit, is a holistic healing system originating from ancient India. It emphasizes the interconnectedness of the body, mind, and spirit, and aims to restore balance for optimal

health. Ayurveda utilizes natural remedies, diet, lifestyle modifications, and various therapeutic techniques to address imbalances and promote overall wellness.

Ayurveda categorizes individuals into different body-mind constitutions known as doshas: vata, pitta, and kapha. Astrology can provide additional insights into these constitutions by analyzing the planetary positions at the time of birth. By understanding our doshas and astrological influences, we can personalize our Ayurvedic practices to maintain balance and prevent imbalances that may lead to health issues.

Ayurveda employs various herbal remedies to restore balance and treat specific health conditions. Astrology can complement Ayurvedic treatments by identifying specific herbs that resonate with the planetary influences affecting an individual’s health. Additionally, gemstone therapy, which assigns gemstones to different planets, can enhance the healing process by aligning planetary energies.

The Mandukya Upanishad (MU 1-1-5) states that तत्रापरा ऋग्वेदो यजुर्वेदः सामवेदोऽथर्ववेदः शिक्षा कल्पो व्याकरणं निरुक्तं छन्दो ज्योतिषमिति । अथ परा यया तदक्षरमधिगम्यते । “*Siksha, Kalpo, Vyakaranam, Niruktam, Chando Jyotishamiti | atha parA yayA tadksharamadhighamyate* !”. Further, the Paniniya Shiksha (41- 42), describe Veda as a *Purusha*, having six limbs as six *Vedangas* - Chandas are two feet, Kalpa are two arms, Jyotisha are eyes, Nirukta - ears, Shiksha - nose & Vyakarana is mouth.

Astrology is one of the Six Vedangas, which came as Smruthi from sages/saints/seers over the ages as part of our Sanatana Dharma.

Jyotish is Knowledge of Light/Jyoti. In English it is known as Astrology (origin from Greek) – Aster – A Star and Logos – Logic/ reason). Astrology or Jyotish also known as *Skanda Triaya* has three branches:

1. **Siddhantha - relates to Astronomy** – Deals with planetary motion and astronomical aspects – Schools – Surya, Romaka, Paulisha, Vashishtha and Pitamah. Astrology uses data provided by astronomers to prepare astrological tables i.e., *Panchanga*, Ephemeris are prepared.
2. **Hora – Natal /Human Horoscope** – Derived from Ahorat (day & Night) – deals with activity of human beings in relation to heavenly bodies/planets. By casting a chart called horoscope with respect to POB, DOB and TOB, the past, present, future events can be predicted.
3. **Samhita (Mundane Astrology)** – Concerned with planetary motions and their influence on mundane and

meteorological affairs-weather, storms, earthquakes, political changes, wars, etc.

Ayurveda is composed of two words, *āyu*, “life” or “longevity”, and Veda, “knowledge”, translated as knowledge of longevity or knowledge of life and longevity. The knowledge of Ayurveda emanated from Vedas as Sruthi. Ayurveda is part of Atharvaveda. Ayurveda has eight ways to diagnose illness, called *Nadi* (pulse), *Mootra* (urine), *Mala* (stool), *Jihva* (tongue), *Shabda* (speech), *Sparsha* (touch), *Druk* (vision), and *Aakruti* (appearance).

Dhanvantari is the physician of the Devas in Hinduism. He is regarded to be an avatar of Vishnu. He is mentioned in the Puranas as the God of Ayurveda.

Medical Astrology is one of the disciplines or branch of Astrology and part of celestial science that deals with the zodiacal, planetary and stellar influences has a notable affect on the health constitution, functions and habits of life.

Configuration of planets in heavens in certain angular positions emanates certain forces of energies. These energies when not in harmony with the energies of an individual brings physical and mental disturbances. Each zodiac sign represent a certain part of the human body and the diseases peculiar to it. Each planet indicates certain type of diseases. Disease and death are due to the disturbances in the laws of proportion and conjunction of natural forces emanating from the planet and the times at which these disturbances occur. The diseases that occur due to the disturbances of law of proportion can be ascertained before they occur and with adequate remedies these evil influences can be reduced to certain extent. Since times immemorial, both

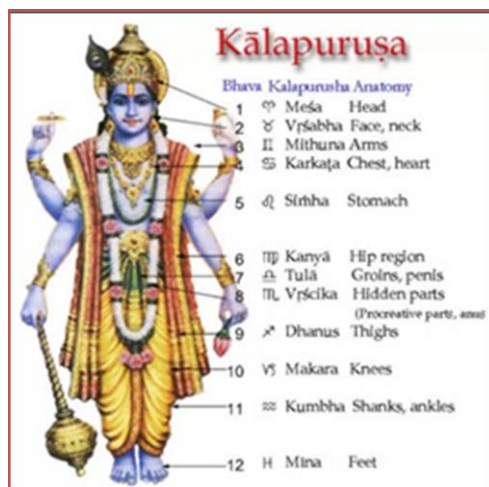
medicine and astrology have constituted a way of life and these were developed as a part of Sanatana Dharma and part of Indian ancient knowledge. An astrologer is able to diagnose diseases and help the mankind to take preventive measures. Areas where the Medical Astrology can play a useful role in individual horoscope are: 1. Timing of an illness – Caution, 2. Nature of an illness – Diagnosis, 3. Course of an illness – It is the outcome, 4. The method of treatment, 5. Astrological remedies and 6. After effect of treatment.

Kalapurusha and Planetary Positions

The planets correspond to the different systems of human body, as Lords of respective Bhavas/Rasi/Signs of Kalapurusha are: 1. Sun – The Bone System, 2. Moon – The Circulatory System, Mars – The Muscular System Mercury – The Veins, Venus – The Reproductive System Jupiter – The Digestive System, and Saturn – The Excretory System. The Kalapurusha and the planetary positions are depicted in the Figure 1.

Figure 1: Kalapurusha and Planetary Positions

[Source: <https://www.astrogle.com/astrology/signs-and-constellations-relations-to-diseases.html>]



The planetary positions at the time of birth clearly indicate the nature of the disease that can occur in an individual and the time and place it would affect. The twelve signs of the zodiac from Aries to Pisces and the 12 houses govern different organs of the body. The combos of the planets also affect organs governed by them.

In general, the sign that occupies by an evil planet indicate some disturbances in that organ, on the contrary, the sign that occupies the benefic planet indicate well being of that organ. Also, each planet is given control over some dosha (humour) causing disease and the type and seat of disease depend upon the nature of the planet and the particular sign occupied by it and the period of suffering is denoted by the Dasha and Bhukti of such a planet. Sixth house is considered for diseases hence it is important to take Virgo into account being the 6th Zodiac sign from Aries. It is believed that, the health is perfectly maintained when all the chemical constituents of the blood are present in normal quantities. When they are adulterated, disease sets in. Therefore, when the Virgo is afflicted by the vibration of malefic planets the whole world must suffer from some sort of disease or ill health.

Significance of Medical Astrology

Medical Astrology is a science which helps forecasting diseases through someone's birth chart. It provides proper solutions so that there should be minimum effect of diseases on human body. Every planet governs a specific human body part. Strength and weakness of corresponding body parts are dependent on auspicious and inauspicious planetary effects of stars according to their ruling effects on

different body parts. E.g. Strong position of Mercury would result in healthy and beautiful skin and the weaker one leads to skin disorders, problem in pancreas, eczema etc. Impact of the forecasted chronic diseases can be reduced to minimum after following the recommended Vedic solutions. Few Chronic diseases, which have no solutions even in medical science, can be cured with the help of 'Medical Astrology'. This science helps finding the proper root cause of the problem after thorough studying someone's natal chart which plays an important role in curing such incurable disorder. Medical Astrology enables permanent medical or ailment solutions to incurable diseases, through Indian System of Medicine, i.e. AYUSH – Ayurveda, Yoga, Unani, Siddha and Homeopathy – all emanated from Sanatana Dharma, except Unani.

Ayurveda and Medical Astrology

The notional depiction of Zodiac Marg in 12 signs/7 planets of 27 Nakshtras, in the form of a Chart is represented as Figure 2.

Each sign will have 30 degrees corresponding to 1 day or Horo (that is why it is called Horoscope), thus representing to 360 days of the movement and completion of one cycle of Sun in Orbit, alongwith other planets. As per Astrology this is Kalapurusha Natal Birth Chart (horoscope).

Depending on the movement & placement of Sun in one of the 12 houses at the particular date and time of birth of house will be Ascendent or Lagna or First House, followed by the respective planets movement /placement in the other respective houses, of that particular person's natal or birth chart.

The 12 Zodiacal Signs/houses and the seven (7) planets in Astrology represent the

Five Elements (Ether, Fire, Air, Earth & Water) of Ayurveda. The ancient astrological savants assigned everything in the Universe to a planetary ruler, and considered all as the manifestation of the Elemental Five and their respective qualities – hot and dry, cold and dry, hot and humid, cold and humid. Jupiter rules "Kapha" and the Sun "Pitta" (the three humors of Ayurveda). These elements were understood in a physical and metaphysical sense, as per the principle "As Above, So Below". Many body constitutions are defined in Ayurveda. The Phlegmatic (predominance of Kapha), the Biliary (predominance of Pitta) & the Windy (predominance of Vata). The Seven Planets correspond to the three humours (*Doshas*): 1. Jupiter – Kapha, 2. Sun – Pitta, 3. Moon – Vata & Kapha, 4. Mars – Pitta, 5. Mercury – Pitta, Vata & Kapha. 6. Venus – Vata & Kapha and 7. Saturn – Vata.

The seven planets correspond to the Seven Gross Tissue – elements (*dhatus*) 1. Jupiter – Fat, 2. Saturn – Veins, 3. Mars – Bone Marrow, 4. Sun – Bones, 5. Moon – Blood, 6. Mercury – Skin, and 7. Venus – Seminal Energy.

The three fundamental bodily bio-elements or *doshas* (humour) called *Vata*, *Pitta*, and *Kapha*. *Vata* is Aakash and Vayu; *Pitta* is Agni and Jal; *Kapha* is Jaland Prithvi. All the three doshas are in proportionate balance in human body. The Planetary Rulers of the six Elements are: Sun (Soul) and Mars (Agni), Mercury (Prithvi), Saturn (Vayu), Moon (Mind) and Venus (Jal), and Jupiter (Aakash). Being karming planets, Rahu and Ketu are trouble makers and influence other planets to create troubles.

Figure 2: Notional Depiction of Zodiac Marg[Source: <https://en.rattibha.com/thread/1522212950622097408>]

Stars Count	Name	Location (Sidereal Longitude)	Ruler	Pada 1	Pada 2	Pada 3	Pada 4
1	Ashvini (अश्विनी)	0–13°20' Aries	Ketu	चु Chu	चे Che	चो Cho	ला La
2	Bharani (भरणी)	13°20'–26°40' Aries	Venus	लौ Lu	लू Lu	ले Le	पो Lo
3	Krittikā (कृत्तिका)	26°40' Aries – 10°00' Taurus	Sun	अ A	इ I	उ U	ए E
4	Rohini (रोहिणी)	10°00'–23°20' Taurus	Moon	ओ O	वा Va/Ba	वी Vi/Bi	वु Vu/Bu
5	Mrigashira (मृगशिरा)	23°20' Taurus – 6°40' Gemini	Mars	वे Ve/Be	वो Vo/Bo	क Ka	की Ke
6	Ārdra (आर्द्रा)	6°40'–20°00' Gemini	Rahu	कु Ku	घ Gha	ङ Ng/Na	छ Chha
7	Punarvasu (पुनर्वसु)	20°00' Gemini – 3°20' Cancer	Jupiter	के Ke	को Ko	हा Ha	ही Hi
8	Pushya (पुष्य)	3°20'–16°40' Cancer	Saturn	ह Hu	हे He	हो Ho	ड Da
9	Āshleshā (आश्लेषा)	16°40' Cancer – 0°00' Leo	Mercury	डो Di	डू Du	डे De	डो Do
10	Maghā (मघा)	0°00'–13°20' Leo	Ketu	मा Ma	मी Mi	मू Mu	मे Me
11	Pūrva or Pūrva Phalgunī (पूर्व फल्गुनी)	13°20'–26°40' Leo	Venus	नो Mo	टा Ta	टी Ti	टू Tu
12	Uttara or Uttara Phalgunī (उत्तर फल्गुनी)	26°40' Leo – 10°00' Virgo	Sun	टे Te	टो To	पा Pa	पी Pi
13	Hasta (हस्त)	10°00'–23°20' Virgo	Moon	पू Pu	ष Sha	ण Na	ठ Tha
14	Chitrā (चित्रा)	23°20' Virgo – 6°40' Libra	Mars	पे Pe	पो Po	रा Ra	री Ri
15	Svātī (स्वाती)	6°40'–20°00' Libra	Rahu	रू Ru	रे Re	रो Ro	ता Ta
16	Vishākhā (विशाखा)	20°00' Libra – 3°20' Scorpio	Jupiter	ती Ti	तू Tu	ते Te	तो To
17	Anurādhā (अनुराधा)	3°20'–16°40' Scorpio	Saturn	ना Na	नी Ni	नू Nu	ने Ne
18	Jyēsthā (ज्येष्ठा)	16°40' Scorpio – 0°00' Sagittarius	Mercury	नो No	या Ya	यी Yi	यू Yu
19	Mūla (मूल)	0°00'–13°20' Sagittarius	Ketu	ये Ye	यो Yo	भा Bha	भी Bhi
20	Pūrva Ashādhā (पूर्वाषाढा)	13°20'–26°40' Sagittarius	Venus	भू Bhu	घा Dha	फ Bha/Pha	ढा Dha
21	Uttara Ashādhā (उत्तराषाढा)	26°40' Sagittarius – 10°00' Capricorn	Sun	भे Bhe	भो Bho	जा Ja	जी Ji
22	Shravana (श्रवण)	10°00'–23°20' Capricorn	Moon	खी Ju/Khi	खू Je/Khu	खे Jo/Khe	खो Gha/Kho
23	Shravishthā (श्रविष्ठा) or Dhanistā	23°20' Capricorn – 6°40' Aquarius	Mars	गा Ga	गी Gi	गु Gu	गे Ge
24	Shatabhishā (शतभिषा) or Shatataraka	6°40'–20°00' Aquarius	Rahu	गो Go	सा Sa	सी Si	सू Su
25	Pūrva Bhādrapadā (पूर्वभाद्रपदा)	20°00' Aquarius – 3°20' Pisces	Jupiter	से Se	सो So	दा Da	दी Di
26	Uttara Bhādrapadā (उत्तरभाद्रपदा)	3°20'–16°40' Pisces	Saturn	दू Du	थ Tha	झ Jha	त्र Da/Tra
27	Revatī (रेवती)	16°40'–30°00' Pisces	Mercury	दे De	दो Do	च Cha	ची Chi

By analyzing the horoscope, the astrologer can discern the badly placed planet and the corresponding Dhatu which has caused the problem and can prescribe Ayurvedic remedial treatment. For example, due to affliction or bad position of Jupiter, in a particular birth chart of a person, there can be digestive tract disorders. Natural malefics in the six House, which represents the bhava of *Runa*, *Roga* and *Satru*, may create hyperacidity and gas trouble. Affliction either to the 7th house means disorders of the digestive tract, hyperacidity and gas trouble. The same holds good for the 6th house. If the 6th house or the 7th house is afflicted, one should be very careful about the body's acidity level. If the 12th house is afflicted by malefic planets, there can be affliction to the feet. We have seen many a patient suffering

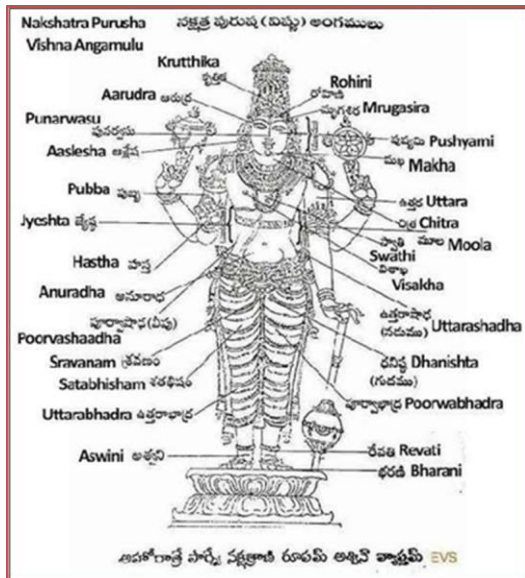
from 12th house affliction and which manifests as problems on the feet. Similarly, the 4th house affliction means trouble to the heart. A native can have heart problem if the person has the Rahu in the fourth house. Rahu in the Heart region in the horoscope had effectuated this problem. Affliction to any house indicates affliction to the corresponding part of the body. Rahu – or any other malefic – in the sixth is indicative of stomach trouble and ulceration. Fourth house affliction means that the heart is afflicted and first house affliction means that the head is afflicted.

Nakshatras and Body Parts

In Vedic astrology, 27 Nakshatras have been categorized on the basis of body parts of Veda Purusha (Figure 3). Each

Figure 3: Nakshatra Purusha with Body Parts

[Source:<https://twitter.com/HinduMediaWiki/status/1324704144582533121>]



nakshatra has been associated with some or the other part of human body. When a nakshatra is afflicted in a horoscope, the native has to suffer from the problems related to the parts of his body that are associated with the afflicted nakshatra. Each Nakshatra indicate certain part/s of the body in the human beings and a brief account is mentioned here under:

Krittika

Agni is the lord of Krittika Nakshatra. It represents eyes, brain, face, neck, throat, tonsils, and lower jaw. The native suffers from problems related to these body parts when the Krittika nakshatra is afflicted in the horoscope.

Rohini

This is fourth nakshatra and Moon is the lord of it. It represents face, mouth, tongue, tonsils, neck, cervical and vertebral. These body parts may cause problems when the Rohini nakshatra is afflicted in the horoscope.

Mrigshira

This Nakshatra comes in the fifth place and Mars is the ruling planet. First and second phase of the nakshatra represents chin, cheeks, larynx, palate, blood vessels, tonsils, cervical nerves come. The third and fourth phase represents voice, shoulders, ear and upper ribs come. When it is afflicted the native suffers from problems related to these organs.

Arudra

This is the sixth nakshatra and Rahu is the ruling planet. It represents right neck, arms and shoulders come fall. The native with afflicted Arudra nakshatra in his horoscope is likely to suffer illness related to these organs.

Purnavarsu

Jupiter is the lord of this seventh nakshatra. The first, second and third part of the nakshatra represent the right ear, neck and shoulder bones. The fourth stage represents lungs, respiratory system, chest, abdomen, pancreas, liver and chest. Afflicted Purnavarsu nakshatra causes disease-related to the mentioned parts.

Pushyami

Saturn is the lord of Pushyami Nakshatra. It represents lungs, stomach and ribs. The native has to suffer from the problems related to these organs when the Pushya nakshatra is afflicted.

Ashlesha

This is the ninth nakshatra and Mercury is the ruling planet. It represents lungs, stomach, pancreas, and esophagus. If this nakshatra is afflicted, the native suffers from the diseases related to these organs.

Magha Nakshatra

Ketu is the lord of this nakshatra. It represents spinal cord, heart, back, spleen, and aorta. Afflicted Magha causes problems related to these organs.

Purvaphalguni

It is the eleventh constellation and Venus is the ruling planet. It represents heart and spine. Afflicted Purvaphalguni gives health complications related to these organs.

Uttaraphalguni

Sun is the ruling planet of this twelfth nakshatra in the bhachakra. This first phase of this nakshatra represents spine. The second, third and fourth stage represents intestines, bowels and lower intestine. If afflicted in the birth chart the native has to suffer from problems related to these body parts.

Hasta

This is the thirteenth nakshatra and Moon is the ruling planet. It represents intestines, entrails, inter secretion glands and enzymes. The afflicted nakshatra causes problems in these organs.

Chitra

Mars is the ruling planet of this nakshatra. The first and second stage of this nakshatra represents abdominal aorta. The third and fourth stage represent renal, lumbar region, hernia, lower part of the spinal cord, nerves, etc.

Swati

Rahu is the lord of Swati Nakshatra. It represents skin, gallbladder, knees and

uterus. The native with afflicted nakshatra in his horoscope is likely to suffer illness related to these organs.

Vishakha

This is the sixteenth nakshatra of bhachakra ruled by Jupiter. The first, second and third phase represent the lower part of the stomach, gall bladder, kidney, prostate and pancreas. The fourth stage represents bladder, urethra, anus, genitals and prostate gland.

Anuradha

Saturn is the lord of this nakshatra. It represents bladder, rectum, genitals, pubic bones, nasal bones, etc. If afflicted, the native suffers the illnesses related to these organs.

Jyeshtha

This is the eighteenth nakshtra of bhachakra. It is ruled by Mercury. This nakshatra represents anal, ovaries and womb. When it is afflicted the native suffers from problems related to these organs.

Moola

This is the nineteenth nakshtra of bhachakra. It is ruled by Mercury. It represents hip, thighs, veins, arthritis, etc. The native suffers from problems related to these organs on affliction of this nakshatra.

Purvashadha

Venus is the ruler of this nakshatra. It represents hips, thighs, nerves, pelvic region, bloodglands, spinal cord, the sacral area, etc

Uttrashadha

This is the twenty first nakshatra and ruled by

Sun. The first phase of nakshatra represents thighs and blood vessels. The second, third and fourth stage represent knee and skin. Afflicted nakshatra leads to suffering diseases related to these organs.

Shravana

Shravana nakshatra is ruled by Moon. It represents skin knees and lymphatic vessels. Afflicted nakshatra can cause problems related to these organs in the body.

Dhanishtha

This nakshatra is ruled by Mars. The first and second phase of the nakshatra represent knee cap. The third and fourth phase represents ankle and the space between ankle and knees. Afflicted nakshatra causes suffering and discomfort in these organs.

Shatbhisha

This nakshatra is ruled by Rahu. It represents knees, muscles and leg tubes. If afflicted in the birth chart the native has to suffer from problems related to these body parts.

Purvabhadrapad

This is the twenty fifth nakshatra and ruled by Jupiter. The first, second and third phase represents ankle. The fourth phase represents paws and feet.

Uttrabhadrapad

Saturn is the ruling planet of this nakshatra. It represents feet. The native suffers from problems related to this specific body parts when the nakshatra is afflicted in the horoscope.

Revati

This is the last nakshtra in the bhachakra. It is ruled by Mercury. It represents fingers and toe nails. The native is likely to suffer from problems related to these organs if the nakshatra is afflicted in the horoscope.

Ashwini

Ketu is the planetary lord of this Nakshtra and it comes under the category of Gandamool Nakshatra. This is the reason it represents brain. All the diseases related to brain are analyzed on the basis of the position of Ashwini in the horoscope.

Bharni

Venus is the lord of this nakshatra. This nakshtra represents skull and eyes. The natives are likely to get injuries around eyes since Venus is the lord of Bharani Nakshatra and Karak of eyes.

The Nakshatra homa is performed while chanting the *Nakshatra Iṣṭi* (also called the *Nakshatra Suktam*). It is performed with the elaborate mantra as revealed in the *Taittirīya Brāhmaṇa* (3-1-1).

Persons of Unsound Health

As per Astrology this is Kalapurusha Natal Birth Chart (Horoscope). Depending on the movement and placement of Sun in one of the 12 houses at the particular date and time of birth of house will be Ascendent or Lagna or First House, followed by the respective planets movement /placement in the other respective houses, of that particular person's natal or birth chart. Prarabdha karma gives disease. In Vedic Astrology to know about *Prarabdha karma*, which we have to check:

- Mainly the 6th house that shows the

Prarabdha karma or our debt to everything and everyone around us. The 6th house is house of debts, diseases, enemies. We got in this life, - actually generated through our karma in our past lives. If the 6th, strong and heavy with planets, it shows that this birth is to mitigate the *Prarabdha karma*.

- The 5th house is the house of our past life good deeds or *Purva Punya* and the 9th house is the house of our past life.

A person can be judged of un-sound health if he has the following astrological combinations:

- If lagna lord is with 6th House lord of Horoscope
 - If Sun is in lagna but not Exalted (*Utchha stithi* in that house) or in Own house, and Moon in 5th and 6th house and Lagna lord is with natural malefic (papa or bad or not helping planets).
 - In lagna Sun Moon and Saturn are placed.
- Malefic planets in the lagna and is in *papa kartari* (hemmed between to bad planets).
- If the Jupiter, Venus & Moon are placed in 6th, 7th and 8th houses.
- If the 11th lord is placed in 6th house
- If 6th, 8th and the 12th lords are placed in own houses.
- If lagna lord is malefic planets in 6th, 8th or 12th house.
- If no malefic planets in 3rd, 6th and 11th houses.
- If malefics in Trines and quadrants and/or Gulika/Mandi is placed along with lagna lord

- If lagna lord is placed in 8th house and in watery sign.
- If there is very less points in 1st and 8th house in Sarvastakavarga (astrological interpretation method).

For a general understanding Benefic/Subha/Auspicious/Good doing planets are – Jupiter, Moon, Venus and Mercury. On the other hand, Malafice/papa/Inauspicious/bad doing planets are: Sun, Mars and Saturn. Rahu, Ketu are shadow planets And they influence the house lord planet or planet housed in that sign and behave or give results like them .For example if Rahu is in Mars house, Rahu behaves like Mars and aggravates Martian qualities.

An efficient astrologer is able to indicate the severity and outcome of illness basing on adversely affected planets, houses and nakshatras. Medical astrologer, while studying a chart with respect to disease and its Severity, need to consider:-

- When bad planets like Saturn, Mars, Rahu and Ketu are placed in bad houses.
- When bad planets are placed in Virgo/Scorpio/Pisces (6/8/12th houses).
- When bad planets occupy the Ascendant, or placed with Sun and Moon (body soul and mind).
- Disease usually manifests in the Mahardasa/Antardasa of a planet or planets adversely disposed towards the lagna.

As Disease usually manifests in the MD/AD of a planet or planets adversely disposed towards the lagna. Therefore, Recovery is possible if the subsequent dashas are of benefic in nature and also if Sun is strong in natal chart. If such benefic MD/AD

lords are connected directly with lagna, lagna lord, it can be said recovery from disease would be smooth.

- If there is dashas of malefic planets like Saturn, Rahu or Ketu, it can be said that the native will suffer for considerably longer period of time or chronic disease.
- Indications of Cure or recovery can be analysed from Strong Lagna, Strong 6th Lord leading, favourable upcoming dasha (MD/AD/PD), favourable upcoming transit and Jupiter's aspect.
- Factors that could lead to good health or recovery from disease are: – 1. Strong lagna; 2. Strong Lord of the lagna; 3. Good Yoga around the lagna or the Lord of the lagna; 4. Occupation by the strong Sun in the lagna; 5. Placement of the Lord of the sixth house or malefic planets in 6th house; 6. Placement of Saturn in the 8th house; 7. Strong Lord of the 8th house; 8. Unaffected Moon.

As such a Medical Practitioner, either himself having knowledge of Medical Astrology or in association with a good Astrologer will be able to do correct or exact diagnose of an ailment at early stages itself, basing on the symptoms of a person, advise the appropriate medication, cure and heal the patient as early as possible and Medical Astrology can be used as an efficient and effective tool by a Medical Professional always and all along.

Conclusion

In conclusion, Medical Astrology helps in forecasting diseases through someone's birth chart. It provides proper solutions so that there should be minimum effect of diseases on human body. Strength and weakness of

corresponding body parts are dependent on auspicious and inauspicious planetary effects of stars according to their role on different body parts. Doctor with Astrological background, has the capability to forecast effect of diseases with exact timing and solutions in advance. This helps finding the proper root cause of the problem from natal chart which plays important role in curing such incurable disorders- through Ayurveda, Yoga, etc. Medical Astrology enables Medical Practitioners, to correctly and exactly diagnoses the onset of disease, understand real cause and use of appropriate medication to cure the disease. With astrological tools, An Ayurveda Practitioner can holistically and thoroughly treat a Patient in 3 forms i.e., Body, Mind, and Soul for timely cure of disease. Further, by applying Astrological techniques, Ayurveda can imbibe confidence among the people and can be lifted from the level Alternate medicine to the so called main stream of medicine – Alopahy – as part of Internal Medicine, bringing back the old glory of Sanatana Dharma.

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Subham Bhuyat
Sarve Janah Sukhino Bhavantu

About Author



Sri P.S. Murthy, M.Com, MBA – He was a Gold Medalist in the Astrology – Jyotish Visarada and Silver Medalist in the Palmistry. Sri Murthy served as a Joint Director in the Information Technology and Communications in the Government of Andhra Pradesh from 2005 to 2012. Later, the Government extended his services till 2016. Prior to this, he served in Central Secretariat Service, viz., Ministry of Finance, Ministry of Home Affairs, Government of India in different capacities. He has extensively travelled to various countries to bring investments in the IT Sector and to promote Andhra Pradesh as the most preferred place for the IT destination. Sri Murthy was recognized with several Awards and Merit Certificates of appreciation from the Government of Andhra Pradesh for his dedicated service to the combined State.



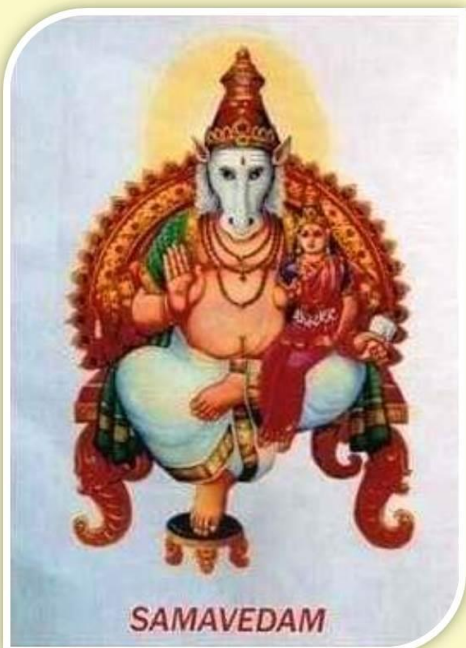
RIGVEDAM



YAZURVEDAM

Section Two

Sanatana Dharma



SAMAVEDAM




ATHARVANAVEDAM

Pūrvāmnāya Sri Govardhana Peetham, Puri, Odisha

Sankaracharya Swami Nischalananda Saraswati






यह भ्रम दूर करने की आवश्यकता है कि धर्म के मार्ग पर चलने से निर्धनता आती है।

— पुरी शंकराचार्य

[@govardhanpeeth](#) [@govardhanmath](#) Govardhan Math, Puri



There is need to clear the doubt that following *Dharma* leads to poverty or lack of affluence.

— PURI SHANKARACHARYA

[@govardhanpeeth](#) [@govardhanmath](#) Govardhan Math, Puri

॥ గురురేవ గతిః ॥

వారణాసి కాశీ విశ్వనాథుని సన్నిధిలో వేదవిద్యార్థులకు కంచి కామకోటి జగద్గురువులు శ్రీ శ్రీ విజయేంద్ర సరస్వతి వారి పరిపూర్ణమైన అనుగ్రహం లభించడం వేద విద్యార్థుల అదృష్టం.

— న గురోరభికం —



Jayanti Mahotsvam of Jagadguru Pujyashri Jayendra Saraswathi Sankaracharya Swamiji at Varanasi - Poornahuti of **Rgveda Samhitā Havan** was performed at the Varanasi Palace Grounds in the presence of HH Pujyashri Shankara Vijayendra Saraswathi Swamiji on **03 August 2023**. The *Rgveda Samhitā* Havan and visesha Veda Parayanams which started on 28th July 2023 culminated today with vidwat samman and vaidika visesha sabha.



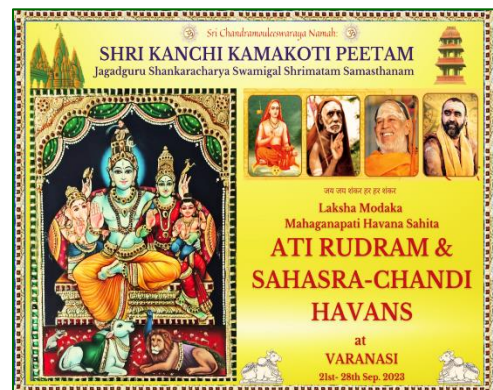
With the benign blessings of Pujyashri Shankara Vijayendra Saraswathi Shankaracharya Swamigal, the **Annual Agnihotra Sabha** was held at Varanasi Kshetram from **5th to 7th August 2023**.



With blessings of Pujyashri Shankaracharya Swamigal, **Annual Panchānga Sadas** was held at Varanasi on **08 August 2023** in Telugu and Tamil languages.



With the benign blessings of Jagadguru Shankaracharya Swamigal of Sri Kanchi Kamakoti Peetam, **Laksha Modaka Ganapati Havana sahita Ati Rudram- Sahasra Chandi Homa** will be performed at Varanasi from **21st to 28th September 2023**.



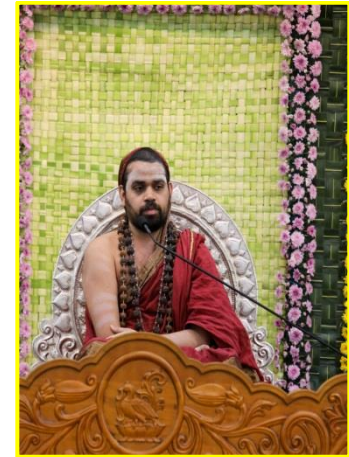
Dakshinamnaya Sri Sharada Peetham, Sringeri, Karnataka

31st Vardhanti Mahotsava

Under the benign blessings and divine guidance of Jagadguru Shankaracharya Sri Sri Sri Bharati Tirtha Mahasannidhanam and Jagadguru Sri Sri Sri Vidhushekhara Bharati Sannidhanam, a series of sacred ceremonies unfolded to illuminate the occasion of the [31st Vardhanti Mahotsava of Sringeri Jagadguru Sri Sri Vidhushekhara Bharati Sannidhanam on August 21, 2023](#). The sanctified proceedings extended over multiple days, each marked by its own significance and rituals.



August 21, 2023 - Monday The auspicious day commenced with the [Ahnika Darshan](#), where thousands of devoted souls were graced with a glimpse of the revered Jagadguru. At 10 AM, the Guruvandana Sabha brought together a multitude of devotees, who were privileged to receive the [Jagadguru's Anugraha Bhashanam](#). This enlightening discourse expounded upon the profound legacy of Jagadguru Sri Adi Shankaracharya and the transformative merits of adhering to His teachings.



Jagadguru Sri Sri Sri Vidhushekhara Bharati Sannidhanam encompassed all, transcending time and space. [The ceremonious Puja to Sri Chandramouliswara](#) brought a fitting crescendo to this spiritually enriched commemoration, a testament to the eternal connection between the earthly and divine realms.



Om Sri Krishna Parabrahmane Namah

Narayaneeya Archana

Narayaneeya Archana at Pravachana Mandira in Sringeri

Sri Krishna Janmashtami is celebrated by all followers of our Sanatana Dharma on *Shravana Krishna Ashtami* all over the world.

The *Shobhakrit Samvatsara Krishna Janmashtami* falls on the night of **Wednesday, the 6th September 2023**. His Holiness Jagadguru Shankaracharya Mahaswamiji of Dakshinamnaya Sri Sharada Peetham Sringeri will perform a special puja on Janmashtami.

The following day (September 7, 2023), special Puja will be performed to Lord Krishna with Tulasi Archana accompanied by chants of Sriman Narayaneeyam and Vishnu Sahasranamavali in the premises of Sringeri Math.

Sriman Narayaneeyam authored by the renowned 16th century scholar, **Melpathur Sri Narayana Bhattatiri** of Kerala is a condensation of Bhagavan Veda Vyasa's Srimad Bhagavata Mahapuranam that contains to 18,000 verses.

Sri Bhattatiri dedicates Narayaneeyam consisting of 100 dashakas and 1034 verses at the Lotus Feet of His Ishta Devata, Lord Krishna and prays for a quick recovery from the disease that has afflicted him. In doing so, he gives an excellent and devout portrayal of Lord Krishna's life and also explains the Advaitic teaching as depicted in Srimad Bhagavatam.



OM vs. AUM – Which is Correct?

Raghava S. Boddupalli

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The sacred syllable **Om** in Sanskrit, ओम् ॐ, (Romanized: *Ōṃ*) is a mantra and an invocation and prime symbol of Sanatana Dharma. The verse asserts that this syllable word **Om** is used often and for diverse purposes, to remind and celebrate that Brahman. It lists the diverse uses of **Om** in ancient India, at invocations, at *Agnidhra* (one of the sixteen priests in *Yajña*, who recites Samaveda), in songs of the *Samans*, in prayers, in *Śāstras*, during *Yajñas* (sacrifices), during rituals, during meditation, and during recitation of the Vedas.

Taittirīya Āraṇyaka

It is variously said to be the essence of the supreme Absolute, Consciousness, Ātman, Brahman, or the cosmic world. **Om** is the *bījākṣara* of the embodiment of Parabrahman as described in the *Taittirīya Āraṇyaka*.

ओम् इत्येकाक्षरं ब्रह्म ।

अग्निर्देवता ब्रह्म इत्यार्षम् ।

गायत्रं छन्दं परमात्मं सरूपम् । सायुज्यं विनियोगम् ॥ – *Taittirīya Āraṇyaka* – 10-33

omityekākṣraṃ brahma ।

agnirdevatā brahma ityārṣam ।

gāyatraṃ chandaṃ paramātmam sarūpam ।

sāyujyam viniyogam ॥ – Taittirīya Āraṇyaka – 10-33

The meaning of the verse is – ‘The unique word **Om** is of *Parabrahman* form, *Agni* is main *Devata*, *Brahma* is related to *Ṛṣi*, *Gayatri* is related to *Chandas*, *Pramatva* is all-pervasive and the terminal point of *Moksha* (liberation)’.

Upaniṣads

The *Aitareya Brahmaṇa* of the *Ṛgveda*, in section 5-32, suggests that the three phonetic components of **Om** (a + u + m) correspond to the three stages of cosmic creation, and when it is read or said, it celebrates the creative powers of the universe.

Om emerged in the Vedic corpus and is said to be an encapsulated form of Samavedic chants. *The syllable Om is used to indicate compliance.* The contemplation of **Om** is revealed and described in the *Taittirīya Upaniṣad* as *Praṇavopāsanam*:

ओमिति ब्रह्म । ओमितीदम् सर्वम् ।

ओमित्येतदनुकृति ह स्म वा अप्यो

श्रावयेत्याश्रावयन्ति । ओमिति सामानि गायन्ति

। ओम् शोमिति शस्त्राणि शग्मसन्ति ।

ओमित्यध्वर्युः प्रतिगुरं प्रतिगृणाति । ओमिति

ब्रह्मा प्रसौति । ओमित्यग्निहोत्रमनुजानाति ।

ओमिति ब्राह्मणः प्रवक्ष्यन्नाह ब्रह्मोपाप्रवानीति ।

ब्रह्मैवोपाप्रोति । – *Taittirīya Upaniṣad* – 1-8.

*Omiti brahma | Omitīdagum sarvam |
omityetadanukṛtirha sma vā apyo
śrāvayetyāśrāvayanti | omiti sāmāni gāyanti |
om śomiti śastrāṇi śaṃsanti | omityadhvaryuḥ
pratigaram pratigrṇāti | omiti brahmā prasauti
| omityagnihotramanujānāti | omiti brāhmaṇaḥ
pravakṣyannāha brahmopāpnavānti |
brahmaivopāpnoti || – Taittirīya Upaniṣad – 1-
8.*

The meaning of the above verses is – when they are told: ‘*Om, recite*’, they recite. Uttering **Om**, they sing the Sama chants. With ‘*Om, Som,*’ they recite the prayers. Uttering **Om**, the *adhvaryu priest* (the main priest for *Yajña*) gives the response. Uttering *Om*, the *Brahma* gives assent. Uttering *Om*, gives permission to offer oblations in the Agnihotra sacrifice. When a Vedic teacher wishes to obtain Brahman he utters *Om*; thus desiring *Brahman*, he verily obtains *Brahman*. The idea is that *Om* is everything as Brahman is everything – *Om iti idam sarvam* as the mantra says; *Om is Brahman* itself – *Om iti brahma* as the mantra puts it **Om is Parabrahman** (*Brahman* without attributes – *nirguṇa*) and *Apara Brahman* (*Brahman* with attributes – *sagūṇa*).

Etymology

The grammatical root word (*dhātu*) for **OM** is: *ava + man, oṃ + kāraṃ - praṇavaḥ avati rakṣaṇādikaṃ karōti* – meaning the mantra that protects; the syllable *Om* is also referred to as **Ōmkāra** (*Ōmkāra*) and **Praṇavam** among many other names. The word ओंकारमाचरिचु in the Śṛṅgāra

naiṣadham (2-69) it is described as अभिलषिंपंग नोंकार माचरिचु (abhilaṣiṃpaṅga nōṃkāra mācarimcu); **Ōmkāra** means *Praṇavam*, *Aṃgīkāram*, *Āraṃbham*, *Brahma*, *Ōm anunakṣaram*; **Ōmkār** means *Mūla daivam*, *Ādi daivam*; **Ōmkārēśvara** means Lord Siva, *Mukkaṃṭi*, *Maheshwara*.

Importance of OM

OM is a sacred *mantra* and also a spiritual incantation made before and during the recitation of spiritual texts, during puja and private prayers, in ceremonies of rites of passage (*samskara*) such as *Upanayanam*, weddings, and during meditative and spiritual activities such as *Praṇava yoga*. It is part of the iconography found in ancient and medieval era manuscripts, temples, monasteries, and spiritual retreats in Hinduism, Buddhism, Jainism, and Sikhism. As a syllable, it is often chanted either independently or before a spiritual recitation and during meditation in Hinduism, Buddhism, and Jainism.

Derivation of OM

Om represents the Sanskrit letters अ (a) उ (u) and म (m) – अकार उकार मकार इति (*akāra ukāra makāra iti – Narayana Upanishad 44 – 51*). More and more people are spelling **Om** incorrectly as AUM, which is incorrect. ओम् (**Om**) has three letters as per the rules of the Sanskrit grammar. The rules say that *Om* is simply ओ (O) म (M). The Sanskrit language has an unusual feature called *sandhi* (connection) that can cause adjacent letters to merge or combine into a

new letter. For example, when the letter अ (a) is followed by उ (u), they combine to form ओ (o), like when Katha of a scripture, is followed by the word the name Upanishad, they combine to form the word, *Katha Upaniṣad*. All this is due to the grammatical rules of *sandhi* that determine how adjacent letters combine. According to those rules, the letter अ (a) followed by उ (u) must combine to form ओ (o), they can never remain side by side. For this reason, to say that ओम् (om) has three letters, a u m is incorrect. It is interesting to consider how this division of ओम् (om) into three letters came about in the first place. An important Vedantic scripture, the *Mandukya Upaniṣad*, uses om in a symbolic way to describe the three states of experience, (1) waking (जागृति), (2) dream (स्वप्न), and (3) deep sleep (सुषुप्ति). It does this by grammatically deconstructing o into a and u, then it symbolically assigns a to the waking state, u to the dream state, and m to the state of deep sleep. When om is chanted again and again, its repetition represents the daily cycle of waking, dream, and deep sleep. Between each two repetitions of om, there is a brief gap of silence in between them. According to the *Mandukya Upaniṣad*, that gap of silence represents pure consciousness. So, just as om emerges from silence and then fades back into silence, so too, the waking, dream, and sleep states arise from pure consciousness and resolve back into that consciousness. This grammatical deconstruction of the letter o into a and u was done for the sake of symbolism, not for the sake of spelling or pronunciation.

Because the *Mandukya Upaniṣad* is so widely studied, many people know that a, u, and m represent the three states of experience. Without knowing the Sanskrit grammar, some people might incorrectly conclude that those three letters actually spell om. It is simply pronounced as OM. There are some hidden details. Sanskrit vowels are generally short or long. The letters a and i are short; they are considered to be one unit in duration (*mātrākalam*). The letters aa and ii are long, as are e and o. All these letters are two units in duration. But the letter o of om is prolated, which means it is extra-long, it is three units in duration. So, om is properly pronounced with an extra-long o, in om. This prolated o is sometimes indicated in writing. As depicted in the figure 1, the om at the top is the Sanskrit symbol that is used most frequently. The second om is formed from the individual letters o and m. The third om is written in the Tibetan script and is used in the well-known mantra, *Om maṇi padme hum*. The fourth om includes the numeral three in between o and m, to indicate that o is three units long. The last om is written in Telugu, a highly revered language of Southern India. So, one can write om in any of these ways, but never as A U M.

Having described about the OM svarupa to be shown in writing, it can be noted how the mystic syllable om is analytically presented in the *Upaniṣads* which teach *Ganeśa vidya* and *Savitṛ vidya* on one hand and in the other like *Taittirīya Upaniṣad* which postulates and describes *Bhṛgu vidya*. Vidyas are the tools and wisdom ridden knowledge. The repetition of *Om Śanti Śanti Śantih* thrice is to remove the three kinds of obstacles, viz. *Ādhyātmika* (from the self), *Ādhidaivika*

(from the heavens) and *Ādhibhautika* (from living beings).

Hariḥ OM

- *OM Tat Sat* -

Figure 1: Representation of ‘OM’ in few Languages and Scripts



అష్టాదశ శక్తి పీఠములు

డాక్టర్ (శ్రీమతి) ధారా విజయలక్ష్మి

హిందువులు పార్వతీదేవిని ఆరాధించే దేవాలయాలలో, పురాణ గాథల ఆధారంగా, ఆచారాల పరంగా ప్రాధాన్యత పొందిన కొన్ని స్థలాలను శక్తిపీఠాలు అంటారు. ఈ శక్తిపీఠాలు ఎన్ని అనే అంశంలో విభేదాలు ఉన్నాయి. ఇవి 18 అని, 51 అని, 52 అని, 108 అని వేర్వేరు లెక్కలున్నాయి. అయితే 18 ప్రధాన శక్తిపీఠాలను అష్టాదశ శక్తిపీఠాలని అంటారు. ఆదిశంకరాచార్యులు 18 పీఠాలపై స్తోత్రమును వ్రాసి, ఆ పీఠాల పేర్లను పేర్కొన్నారు.

ఈ శక్తిపీఠాలు ఏర్పడడానికి కారణం తెలిపే ఒక పురాణగాథ ప్రాచుర్యంలో ఉంది. ఒకప్పుడు దక్షుడు 'బృహస్పతి యాగం' చేసినపుడు అందరినీ ఆహ్వానించి, శివుడిని, సతీదేవిని (కూతురుని అల్లుడిని) పిలవలేదు. దీనికి కారణం, ఒకసారి బ్రహ్మ నిర్వహించిన యజ్ఞములో దక్షప్రజాపతి వచ్చినప్పుడు శివుడు లేచి నిలబడలేదని, అది అతను అవమానముగా భావించి ప్రతీకారం తీర్చుకుంటానని దక్షుడు ప్రతిజ్ఞ చేస్తాడు. శివుడిని అవమానించాలనే ప్రధాన ఉద్దేశ్యంతో, దక్షుడు, వారిరువురిని యజ్ఞమునకు ఆహ్వానము పంపలేదు. పుట్టింటి వారు ప్రత్యేకంగా పిలవాలేమిటి అని సతీదేవి శివుని మాట వినకుండా ప్రమథ గణాలను వెంట బెట్టుకొని యాగానికి వెళ్ళింది. అక్కడ అవమానానికి గురియై, శివనిందను భరించలేక, ఆమె యాగాగ్నిలో తనువు చాలించింది. ఆగ్రహించిన శివుడు, తన గణాలతో యాగశాలను ధ్వంసం చేశాడు.

సతి వియోగాన్ని భరించలేని శివుడు, ఆమె మృత శరీరాన్ని అంటిపెట్టుకుని, తన జగద్రక్షణ కార్యాన్ని మరచాడు. దేవతల ప్రార్థనను మన్నించి విష్ణువు సుదర్శన చక్రంతో సతిదేహాన్ని ఖండించి, శివుని కర్తవ్యోన్ముఖుడిని చేశాడు. సతిశరీర భాగాలు పడిన చోటుని శక్తిపీఠాలుగా భావిస్తారు. ముఖ్యంగా తంత్ర సాధనకు ఆరాధనా స్థలాలు.

తాంత్రిక సాధనలు చేసే శక్తి పీఠాలను, సాత్విక పూజామందిరాలుగా నెలకొల్పి నిశ్చయించిన ఆదిశంకరాచార్యులు, శక్తి పీఠాలలో శ్రీ చక్రాలను స్థాపించారు. ఉత్తర హిందూస్థానము, వంగదేశము, మహారాష్ట్రలోని శ్రీచక్రము నెలకొల్పబడినా కొన్నిచోట్ల తాంత్రిక పూజలు నిర్వహింపబడుతున్నాయి. దక్షిణాదిన శ్రీచక్ర స్థాపన జరిగిన క్షేత్రాలలో పూజలు నిర్వహింపబడుతున్నాయి. కంచిలో అమ్మవారు శ్రీ చక్రముపై కూర్చొనకుండా యోగ ముద్రలు పద్మాసనములో కనబడతారు. ద్రాక్షారామములో మాణిక్యాంబ అమ్మవారు శ్రీ చక్రముపై కొలువై యుంటారు.

శక్తి పీఠాలలో నెలకొన్న పార్వతీ దేవిపై అష్టాదశ కీర్తనలు రచించి, గానము చేయాలనుకున్న సంకల్పంతో ఈ రచనలు చేశాను. అమ్మవారి కృపాకటాక్షములను కులిపించమని వేడుకుంటున్నాను.

శ్రీ శంకరాచార్య విరచిత అష్టాదశ శక్తిపీఠ స్తోత్రము

లజ్ఞాయాం శాఙ్కరీదేవీ కామాక్షీ కాఙ్గికాపురే |
 ప్రద్యుమ్నే శృంఖలాదేవీ చాముణ్డీ క్రౌఞ్చపట్టణే ||
 అలమ్పరే జోగులామ్బా శ్రీశైలే భ్రమరామ్బికా |
 కోల్హాపురే మహాలక్ష్మీ ముహూర్వే ఏకవీరికా ||
 ఉజ్జయిన్యాం మహాకాలీ పీఠిక్యాం పురుహూతికా |
 ఓఢ్యాయాం గిరిజాదేవీ మాణిక్యా దక్షవాటకే ||
 హరిక్షేత్రే కామరూపా ప్రయాగే మాధవేశ్వరీ |
 జ్వాలాయాం వైష్ణవీదేవీ గయా మాఙ్గల్యగౌరికా ||
 వారాణస్యాం విశాలాక్షీ కాశ్మీరేషు సరస్వతీ |
 అష్టాదశ సుపీఠాని యోగినామపి దుర్లభమ్ ||
 సాయజ్కాలే పఠేన్నీత్యం సర్వశత్రువినాశనమ్ |
 సర్వరోగహరం దివ్యం సర్వసమ్మత్కరం శుభమ్ ||
 ఇతి అష్టాదశ శక్తి పీఠ స్తోత్రం సంపూర్ణమ్ ||

1. శాంకరీదేవి

శ్రీలంకా ద్వీపవాసిని, శ్రీసతి శాంకరీ దేవి సన్నుతింతు
 నమ్మా, సరగున పాలించవమ్మా ||

1. సతి ఊరువు పడిన చోట, స్థితమాయెను శ్రీచక్రము
 అష్టాదశ పీఠములలో, అదె, ఆది పాదమమ్మా ||
2. త్రికోమలిలో వెలసిన, త్రికోణేశ హవరు రాణి
 చరణములు పట్టినాను, చరాచర జగన్మాత ||

2. కంచి కామాక్షి

కంచిలో వెలసిన కామాక్షి అంబ కామితార్థ ప్రదాయిని
 మమ్ముకావవే ||

1. సతినాభి జారిపడగ, మొలవడ్డాణముతో శంకరులు
 ద్వితీయ శక్తిపీఠ మమల్లి రచట ||
2. భండాసుర సంహారిణి, యోగ ముద్రలో నుంటివి
 పాశాంకుశముల బట్టి, పద్మాసన స్థితవైతివి ||
3. శంకరులీ ధామమున 'సౌందర్యలహరి' గూర్చు ||
4. శ్యామాశాస్త్రి నీ దివ్య కీర్తనలు రచించె ||

3. శృంఖలాదేవి

ఓ జనని శృంఖలాదేవి కరుణామయి నీ బిడ్డలమే తల్లి!
 కాపాడుమమ్మా!

1. అవతరించినావట శృంఖలాదేవిగా అమరెను
 పాండువలో తృతయ శక్తి పీఠము నవజాత శిశువును
 లాలించు బాలింతవలె దేవి భక్తుల కెల్ల ప్రేమను
 పంచుదువె ||
2. సతి ఉదర భాగము పతనమైన చోట మాత
 మాంగల్యదా స్థిరముగ నుంటివె ఋష్యశృంగుడు నీకు
 అర్చనలు సలుప ఆది శంకరులు శ్రీ చక్రమే నెలకొల్పా ||
3. భక్తుల పాప శృంఖలములు తొలగించి ముక్తినిొసగే
 తల్లి మాత కృపాకరీ శృంగేరి, ఛోటిల్లా,
 గంగాసాగర్లలో శృంఖలా తలతురే, తృతీయపీఠ
 మున్నదని ||

4. చాముండి

చాముందేశ్వరి కొలువు తీరిన క్రొంచ పట్టణము చూడుడదె చండ ముండాసురుల వధించిన చాముండికి ప్రణతులివె ॥

1. నాల్గవ శక్తి పీఠమదె నాడదేవి నివాసమదె పతనమాయె సతికురులచట అతి ప్రసిద్ధ క్షేత్రమదె ॥

2. దశరా నవరాత్రులు ఘనముగ దేవిని కొలుచు వేళయదె ఆషాఢ భృగు వారములు ఆర్తితో అర్చనలు చేతురె ॥

5. జోగులాంబ

అలంపురములో ఆదిశక్తిరో యోగులమ్మరో జోగులాంబరో

1. తేలు, కప్ప, బల్లి తల్లి శిగన చూడరో శవమే గద్దెగా కూర్చున్న తల్లిరో ॥

2. ఐదవ శక్తి పీఠమదె చూడరో శంకరులమల్లిన శ్రీ చక్రమదె గాంచరో ॥

3. సతి దంతములే పడిన నేలకు మ్రొక్కరో నవ బ్రహ్మములు గల సంగమమదె గనరో ॥

4. తాంత్రిక విద్యలు, సఫలమగు చోటురో అరి భయంకరిని, జోగులమ్మను తలవరో ॥

6. బ్రమరాంబ

శ్రీ గిరి బ్రమరాంబ, శ్రీ గిరి నివాసిని శ్రీ చక్రమున కొలువై, సిరుల వరము లిత్తువా?

1. అరుణాసుర సంహారము, అలవోకగ గావించి పరమేశ్వర ధామములో, బ్రమరాంబగ వెలసితివా?

2. సతి మేని కంఠమచట, పతనమయినదని అరసి ఆదిశంకరులానగమును, ఆరవ శక్తిపీఠము గానెంచె ॥

3. శ్రీ శిఖరమున స్థిరముగ, శివుని పట్టపు రాణివై పాతకముల పారద్రోలి, పాలింతువా సకలజనుల ॥

7. మహాలక్ష్మి

శ్రీ మహాలక్ష్మి పాలయమాం, శ్రీతజన పాలిని పాలయమాం ॥

1. కొల్హాపురి నగరవాసిని, కొల్హాసుర మర్దని పాలయమాం

పశ్చిమదిశ రవికిరణస్పర్శ, పాదయుగళే పాలయమాం ॥

2. పంచగంగా తటినిలయే, పాశాంకుశ కరకమలే పాలయమాం

ఆదిశంకరాచార్యాసేవిత, సప్తమ పీఠనిలయే పాలయమాం ॥

3. సతి నేత్ర పతన స్థలవాసీ, మణిశిల నిర్మిత మహాలక్ష్మి పాలయమాం

ఆదిశేష ఫణి ఛత్రశోభిత, అంబా బాయి, శివశక్యైక రూపిణి పాలయమాం ॥

8. ఏకవీర

మాపూర్ గ్రామమున, మహారాష్ట్రదేశమున మాత ఏకవీర మహిమలు చూపె ॥

1. కొలువాయెమాత, పంచగంగ తటిని కనగలము రేణుక వదనార విందమే ॥

2. ఎనిమిదవ శక్తి పీఠము వెలసి సతికుడి భుజము పతనము కాగా ॥

3. నాగవల్లి దళముల, పోకలతోదంచి నాణ్యమైన మిశ్రమము, ప్రసాదముగ నిత్తురు ॥

4. తాంత్రికులు మంత్ర, తంత్రములు నేర్వ అతి భక్తి శ్రద్ధలతో సేవింతురు తల్లిని ॥

9. మహాకాళ

అవంతిక నగరమున హరసిద్ధి మాతగ సప్త మోక్ష క్షేత్రమున, పూజలందు మహాకాళ ॥

1. రక్త బీజ నిఘాదిని, జగదోద్ధారిణి రమావాణిల నడుమ నెలకొన్న రౌద్రాణి ॥

2. సతి పై పెదవి ఉజ్జయినిలో జార అతులిత నవమ శక్తి పీఠమై ఒప్పారె ॥

3. కాళదాసు భక్తితో సేవించిన కాళికాంబ విక్రముని ఆరాధ్య దైవమా జగదాంబ ॥

4. అంధకాసుర మర్దని, అఘోరాల వేల్పు కొలువైనది మాత క్షిప్రానది తీరాన ॥

10. పురుహుతికా

నీ సాటి దైవము లేదని తలచితినే అమ్మమాయమ్మ పీఠాపురమున కొలువై నావమ్మా మాయమ్మ ॥

1. పురుహుతికా పేర పీఠమెక్కినావమ్మా, మాయమ్మ కుక్కుబేశ్వరుని రాణిని నీవమ్మా మాయమ్మా ॥

2. దశమ శక్తి పీఠమున నుంటివే మాయమ్మ దయగల తల్లివి నీవే నంటినే మాయమ్మ ॥

3. సతిమేని పీఠమిచట జారెనే మాయమ్మా శ్రీ చక్రమున స్థిరముగ నుంటివే మాయమ్మ ॥

4. వేలుపునీవని నమ్మితినే మాయమ్మ అలుపులేక మమ్ముబ్రోవవే మాయమ్మ!

11. గిరిజాదేవి

వైతరణి తీరమున, జాజాపూర్ నుండు శాంత రూపమున నున్న గిరిజమ్మ వెతలు తొలగించి కాపాడవమ్మా!

1. సతినాభి పడిన చోట శ్రీ చక్రమునందు వెలసిన గిరిజమ్మ, వెతలు తీర్చవమ్మా ॥

2. ఎంతో పవిత్రమా ఏకాదశ పీఠము తాంత్రిక శాస్త్రముల నభ్యసించు స్థలము ॥

వైతరణిలో ఆబ్ధికము చేయువారి వెతలు తొలగించి కాపాడవమ్మా!

12. మాణిక్యాంబ

ద్వాదశ శక్తి పీఠమదె, ద్రాక్షారామ మదె దాక్షాయని కపోల మచట, పతనమాయెనని ప్రతీతి ॥

1. శ్రీ చక్రము ఆసనముగ, శోభిల్లిన మాణిక్యాంబ భీమేశ్వరుని చెంత, కొలువుతీరిన తల్లి ॥

2. శ్రీ నాథుని రచనలలో, దక్షిణ కాశీ క్షేత్రము, పంచారామము గాను, వాసికెక్కిన క్షేత్రము ॥

13. కామరూపి

నీలాచలము మెరసి, కామరూపి కొలువుతీర హరిక్షేత్రము జగతిలో, ప్రఖ్యాతి నొందెపలు విధముల ॥

1. త్రయోదశ పీఠమందు, కామాఖ్యా స్థితమామె యోని
ముద్రలో చూపెను, నెలవారి నిదర్శనము ॥
2. అంబు బచి అమ్మవారు, అతివ వలె శోభ లీన అరుణ
అంగవస్త్రముతో, అంగనలు పూజింప ॥
3. మంత్ర, తంత్ర విద్యలకు, కేంద్రబిందు వాక్యేత్రము
శివశక్తుల దీవెనలతో, జీవకోటి తరించగ ॥

14. మాధవేశ్వరి

శ్రీ మాత అలోపి దేవి, మాధవేశ్వరి ప్రయాగ తీర్థవాసి,
సర్వమంగళా ॥

1. జగమున శిలరూపముగ వెలసినావు తల్లి జయ జయ
నాదముతో నీ ఊయలనే కొలిచేము ॥
2. సతి వేలు జారెనిచట పూజలు చేసేము చతుర్దశ
పీఠమిదె చక్కగ మ్రొక్కేము ॥
- త్రివేణి సంగమమిదె మంగళ హారతులిచ్చేము
మాధవేశ్వరి, లలితా, మాకభయము లిమ్మా ॥

15. వైష్ణవీ దేవి

త్రికూట పర్వత వాసిని దేవి త్రిభువన పాలిని
పాలయమాం ॥

1. సతిముఖమచట పతనము కాగా జ్వాలా ముఖిగా,
వెలుగు చూపిన ఆది కుమారి, కట్రావాసిని సకల
శుభంకరి, పాలయమాం ॥
2. నిరతము జ్వాలగ వెలుగు లీనుట నరులెరుగని పరమ
రహస్యం కోరువరములు ఈడేరునని పరి పరి విధముల
ప్రార్థించేరు ॥

3. పంచదశ పీఠరూపిణి పాప విమోచని పాలయమాం
ఆదిశక్తి పరి పాలయమాం, వైష్ణవీ దేవి పాలయమాం ॥

16. మాంగళ్య గౌరి

మాంగళ్య గౌరి మహిమలు చాటె మానవుల పోషించు
స్తనరూపమున వెలసి ॥

1. షోడస శక్తి పీఠములో షోడస పూజలు చేసేరు జనులు
2. ఆశ్వీయుజ అష్టమిన అర్చింతురు అంబను
3. ఆచరించు క్రతువులు అచ్చైరవు కల్గించు అమ్మసన్నిధిలో
గయలోన వీక్షించ ॥
4. ఫల్గుణీ నది తటినీ ప్రజలాసక్తితో పలుతంత్ర విద్యలను
అభ్యసించేరు ॥
5. బ్రతికుండగానే తమ పిండ ప్రధానము చేతురు ప్రజలు
గయలోన కనగ ॥

17. విశాలాక్షి

వారణాశి యందు, కనుల కాంతులతో విశాలాక్షిగౌరి,
కామితము వీడేర్ల ॥

1. సప్తదశ పీఠమై, కాశికాపురము వాసికెక్కె విశాలాక్షి
కటాక్ష మున ॥
2. నాడు సతి మని మణికల్పక జార పుడమిలో విశాలాక్షిగా
నిలచి శంకరార్చిత శ్రీ చక్రమున కొలువై కామితము
లోసగు కల్పవృక్షమై ॥
3. భాద్రపద శుక్ల తదియ నాడార్చితో బహులీతుల,
అర్చించు జనుల విన్నపముల జాగు చేయక మన్నించి
విశాలాక్షి గౌరి, విజయములోసగు ॥

18. సరస్వతి

శ్రీ సరస్వతి నమోస్తుతే అష్టాదశ పీఠశక్తి అమలే, విమలే

॥

1. వాహిని మధుమతి తటనిలయే వాగ్దేవి హర్మభో
చలవాసే విధిపత్ని, పుస్తకపాణి, వీణా గానామృత లోలే

॥

2. కాశ్మీరపుర నివాసిని, కల్పన కవితా వాహిని, బల్లర
కావ్య కన్యకే, సకల మంత్రాక్షరే ॥

3. సతి కర కమల పతన స్థల స్థితే శంకర విజయ
కావ్యాలంకృత సర్వజ్ఞపీఠే ॥

గ్రంథ వివరణ సూచిక / ప్రవచనములు

1. శ్రీ ఆదిశంకరాచార్య విరచిత 'అష్టాదశ శక్తి పీఠ
స్తోత్రము'.

2. బ్రహ్మశ్రీ సామవేదం షణ్ముఖ శర్మ ప్రవచనము - 'అష్టాదశ
శక్తిపీఠ రహస్యాలు'.



డాక్టర్ (శ్రీమతి) ధారా విజయలక్ష్మి, యం.యస్.సి., యమ్.ఫిల్., పి.హెచ్.డి. - వీరు పి.హెచ్.డి పట్టము
భౌతికశాస్త్ర విభాగం, ఆంధ్ర విశ్వవిద్యాలయము నుండి పొందియున్నారు. ఆమె తన పరిశోధనకు
'ఉత్తమ పరిశోధనా ఫీసిస్' అవార్డును అందుకున్నారు. వీరు సంగీత గాత్రవిభాగంలో డిప్లొమా
పొందియున్నారు. డాక్టర్ విజయలక్ష్మి ఉపాధ్యాయునిగా భౌతిక ఎలక్ట్రానిక్స్ విభాగం, యస్.కె.ఆర్.

కళాశాల, రాజమహేంద్రవరంలో పనిచేసి, ప్రస్తుతం పదవీ విరమణ చేసినారు. వీరు అనేక పరిశోధనా వ్యాస రచనలు చేసి,
అనేక పుస్తకములు రచించి ప్రచురణ చేసినారు. వీరు 'పోతన భాగవతంలో భౌతిక శాస్త్ర అంశాలు' అనే పరిశోధన వ్యాసానికి
ఉత్తమ వ్యాసంగా బహుమతి పొందియున్నారు. శ్రీమతి విజయలక్ష్మి 'శ్రీవిష్ణునామ సంకీర్తనలు' తిరుమల తిరుపతి దేవస్థానం
వారి ఆమోదంతో మరియు ఆర్థిక సహాయముతో నాలుగు సంపుటముల గ్రంథము ప్రచురితము చేసియున్నారు. ఈ
గ్రంథమునకు భారత ఉపరాష్ట్రపతి ప్రశంసా పత్రం పొందియున్నారు. ఇవేకాక, వీరు ఆకాశవాణి విజయవాడ,
విశాఖపట్నం, హైదరాబాదు కేంద్రాలలో వివిధ సంగీత కార్యక్రమాలలోను, ప్రసంగాలలోను పాల్గొనియున్నారు.

The Significance of *Pitṛupakṣa* in Hindu Traditions

Introduction

In this article, we delve into the profound significance of *Pitṛupakṣa*, also known as the *Pitṛupakṣa* or the fortnight of ancestors, in Hindu traditions. *Pitṛupakṣa* is a period of deep reverence and remembrance of our ancestors, and it holds a crucial place in Hindu rituals and beliefs.

Essence of *Pitṛupakṣa*

Pitṛupakṣa is an age-old observance in Hindu culture, lasting for sixteen days. The word ‘*Pitṛu*’ refers to ancestors and ‘*pakṣa*’ means a fortnight. This period is dedicated to honouring and paying respects to our departed ancestors, offering them gratitude and seeking their blessings. Hindus believe that during this time, the spirits of deceased ancestors visit the earthly realm, and by performing specific rituals and offerings, we can elevate their souls and seek their blessings.

Significance of *Tarpaṇa* and *Śrāddha*

During *Pitṛupakṣa*, two crucial rituals are performed – *Tarpaṇa* and *Śrāddha*. *Tarpaṇa* involves offering water and sesame seeds to the departed souls to quench their thirst and provide nourishment to their ethereal forms. The *Śrāddha* ceremony is an elaborate affair, where prayers, hymns, and offerings are made to the ancestors. It is believed that by performing these rituals with sincerity and devotion, the souls of ancestors attain peace and liberation.



Importance of Ancestral Blessings

In Hinduism, the concept of lineage and ancestral blessings holds immense importance. It is believed that the blessings of ancestors have the power to positively influence one’s life. By showing gratitude and respect to our forefathers during *Pitṛupakṣa*, we seek their guidance and blessings for a prosperous and harmonious life ahead.

The concept of karma and its impact on one’s life is deeply ingrained in Hindu philosophy. According to the law of karma, the actions we perform in this life shape our future experiences. By remembering and honouring our ancestors during *Pitṛupakṣa*, we acknowledge

the debt of gratitude we owe to them for the life we have received. This recognition leads to spiritual growth and helps in the pursuit of moksha (liberation) from the cycle of birth and death.

The Ancestral Bond – Strengthening Family Ties

Pitṛupakṣa is not only about religious rituals; it is also a time to strengthen family bonds and foster a sense of unity among family members. Families come together to perform the ceremonies, sharing memories of departed loved ones and supporting each other in their grief. This sense of togetherness strengthens the fabric of the family and reinforces the values of love, compassion, and unity.

How to Observe Pitṛu Pakṣa

Observing *Pitṛupakṣa* requires adherence to specific customs and rituals. Families traditionally prepare food offerings and place them on banana leaves to invoke the presence of ancestors. The food is then offered to crows, as they are considered messengers of the dead. Additionally, donations are made to the poor and needy, as it is believed to bring blessings from the ancestors.

The Connection with the Lunar Cycle

Pitṛupakṣa coincides with the waning phase of the moon, specifically during the *Mahālaya Amāvāsyā*, which marks the beginning of this fortnight. The lunar cycle plays a crucial role in Hindu traditions, and this specific time is considered especially auspicious for connecting with ancestors.

The Spiritual Merit of Pitṛu Pakṣa

The spiritual significance of *Pitṛupakṣa* extends beyond seeking blessings for personal prosperity. It is also an opportunity to offer prayers for the welfare of all departed souls, regardless of one's familial ties. Hindus believe in the concept of *Vasudhaiva Kutumbakam*, meaning the world is one family. Therefore, during this period, people offer their prayers for the souls who may have no one to remember them, thus earning spiritual merit.

Conclusion

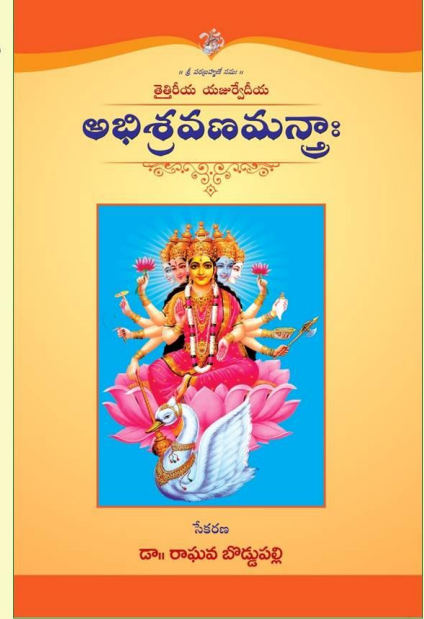
Pitṛupakṣa holds a significant place in Hindu traditions, emphasizing the importance of gratitude, remembrance, and spiritual growth. By performing the *Tarpaṇa* and *Śrāddha* rituals and seeking the blessings of our ancestors, we not only honour our lineage but also strengthen the familial bonds that form the foundation of our society. *Pitṛupakṣa* reminds us of the eternal cycle of life and death and encourages us to lead a life of virtue, compassion, and righteousness.

గ్రంథ

అభిశ్రవణమంత్రాః

సమీక్ష

అభిశ్రవణం లేదా అభిశ్రవణం అంటే గౌరవప్రదమైన శ్రవణం. 'అభిశ్రవణమంత్రాః' అనే గ్రంథం డా. రాఘవ బొడ్డుపల్లి సంకలనం చేసి, ప్రచురించినారు. ఈ మంత్రములు కృష్ణ యజుర్వేద తైత్తిరీయ సంహితా, తైత్తిరీయ బ్రాహ్మణం మరియు తైత్తిరీయ ఆరణ్యకం నుండి సంగ్రహించబడినవి. పితరుల శ్రాద్ధ సమయమునందు శ్రాద్ధభోక్తలు భుజించునపుడు చేయు వేదమంత్ర పఠనమే 'అభిశ్రవణము' లేక 'అభిశ్రవణము'. ఈ అభిశ్రవణ మంత్రములు బిగ్గరగా పఠించవలెను. అతివాస దినమున అభిశ్రవణ పారాయణ చేయుట సంప్రదాయము నందున్నది.



'శ్రాద్ధం' అని పిలువబడే పూర్వీకుల వార్షిక వర్ధంతి సందర్భంగా అభిశ్రవణ మంత్రాలను పారాయణ చేయాలి. బ్రాహ్మణులు (భోక్తలు) భోజనం చేస్తున్నప్పుడు దీనిని బిగ్గరగా జపించాలి, తద్వారా ఈ మంత్రాలను శ్రాద్ధ కర్మలో 'పితృదేవతలను' సూచించే బ్రాహ్మణులు వినాలి. ఈ మంత్రములు 'పితరుల' గురించినవి కాబట్టి, జపించినప్పుడు వారు సంతృప్తి చెంది ఆశీర్వదించి తృప్తి నొందుదురని శాస్త్రమునందు చెప్పబడియున్నది. కాలవ్యవధి ఉన్నవారు చదువుకోటానికీ వీలుగా 'అన్నసూక్తం' కూడా ఈ పుస్తకమునందు పాండుపఠచబడినది. ఈ మంత్రములు చదువుటవలన లేక వినుటవలన చెడుశక్తులు దరిచేరవు. ఇతర అవాంతరములు తొలగిపోవును. ఈ మంత్రములు పితృపక్షము (మహాశయ పక్షము) అన్నిరోజులు మరియు మకర సంక్రాంతి దినమున పారాయణ చేయుటవలన ఉత్తమ ఫలితములు పొందుదురని ఋషులు మరియు వేదగురువులు బోధించియున్నారు.

Veda Samskruti Samiti (VSS)

13-1-62 & 13-1-47/1

Veenapani Nagar, Malkajgiri
Hyderabad, Telangana, India

Harih OM

The Veda Samskruti Samiti (VSS) is offering a **free coaching** for the Samskrita Bharati: Pravesah (Level-1), Parichaya (L-2), Shikshaa (L-3) and Kovida (L-4) Samskritam certificate courses for **February 2024 Batch**, through Google Meet link as follows:

1) Classes by Sri A.H. Prabhakara Rao

A. Evening Classes:

8.30PM to 10.30 PM IST - Daily

Classes schedule to start from – **25th Sep. 2023 to 12th Feb. 2024**

Classes schedules:

- I. Monday & Wednesday... PravEsah
- II. Tuesday & Friday..... Parichay
- III. Thursday & Sunday..... ShikSHaa
- IV. Saturday..... Kovida.

B. Morning Classes:

5.30AM to 7.00AM IST

Classes starting from 24th Sep. 2023.

- I. Saturday & Sunday: PravEsaH
- II. Monday & Tuesday: Parichay

2) Classes by Dr. S(T) Visalakshi, Vice President, Veda Samskruti Samiti.

8:00PM to 10:00PM IST. Starting from 25th Sep. 2023 to 12th Feb. 2024 through Zoom Link.

Class Schedules:

- I. Monday.....ShikSHaa
- II. Wednesday..... Kovida

Registration Procedure: This circular is Only for New Students. Not applicable to our old students. Please register your name by giving the following details:

Note: Students who already registered earlier and are in our groups are **not required** to fill this again.

1. Name:
2. Place:
3. Age:
4. Education:

5. Profession:
6. Faith:
7. Mobile nr. Whatsapp:
8. Email id:
9. Mother tongue:
10. Medium of coaching required: English or Telugu or Hindi.
11. Course opted:
12. Morning/Evening Batch:

Post To: **9246572182** (Whatsapp)

Sri A.H. Prabhakara Rao

Founder & President

Veda Samskruti Samiti

Special Note:

1. Inauguration for all Pravesah course students. Morning batch on 24th Sep. 2023 (Sunday).
Evening Batch on 25th Sep. 2023 (Monday).
2. Link to join classes will be posted by 20th Sep. 2024, in the groups in which your name will be registered.
3. For more details on VSS please see the website: www.vedasamskrutisamiti.org.in
4. Please circulate among your contacts.

- Shubham bhooyaat -



Veda Samskruti Samiti

13-1-62 & 13-1-47/1

Veenapani Nagar, Malkajgiri
HYDERABAD Telangana



Veda Samskruti is an inherent intellectual property of Bhaarata dEsham. It is the basic duty and right of every citizen in Bhaarata dEsham to protect this Intellectual property. Indian Constitution and Law provides provision for protection and preservation of its culture, its monuments, architecture etc.

The Chaturvedas said to have 1131 shaakhaas right up to the time of Aadi Shankaraachaarya and thereafter during last more than ten centuries, many shaakhaas are out of practice due to various reasons and presently only seven shaakaas are in the practice of Guru shiShya parampara.

There is a need to continuously preserve these available shaakhaas which may likely to disappear in future due to various external forces acting in the country vigorously with the power of money and global politics. It is time for the intellectuals of Bharata dEsham to wake-up and work collectively to protect and preserve Veda Samskruti of Bharata dEsham, by empowering the Youth of Bharat dEsham, the future care takers of this great Indian Heritage , with suitable education of our correct history and culture.

The above background lead to formation of this Veda Samskruti Samiti which is registered under Societies acts of Government of Telangana, with Regd. No. 961/2016 by Sri A.H. Prabhakara Rao, who is the Founder and President of the Samiti.

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