

# **NEW FOUND HITHERTO UNKNOWN MALAYALAM TEXT ON AGNI-NEW INSIGHTS ON THE ŚULBASŪTRA TRADITION IN KERALA**

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## **1. The Śulbasūtras**

In Vedic India (India of the Vedic period, c. 3000–500 BCE, includes modern Pakistan also.) the religious ceremonies and sacrifices were performed on altars and not in temples (Explaining the gods, R. L. Kashyap, Sri Aurbindo Kapali Sastry Institute of Vedic Culture, Bangaluru). The altars are raised platforms made of bricks and of specific geometric design. There were two types of sacrifices namely perpetual and timely. The plan of the altar for each one is different and of intricate in design [2]. The design and construction of these altars gave rise to a new branch of knowledge known as Śulbasūtras. The origin of the word can be traced to the words Śulba (cord—The root ‘Sulb’ signifies ‘measuring’ or ‘act of measurement’) and sūtra (aphorisms). They are appendices to Vedic ritual treatises and provide directions for the construction of ritual areas and ritual brick structures described in these treatises. Four of them have been edited and published: Baudhāyana Śulbasūtra [BS], Mānava Śulbasūtra [MS], Āpastamba Śulbasūtra [AS] and Kātyāyana Śulbasūtra [KS] [10]. Four other Śulbasūtras available only in manuscript form are mentioned by Sarasawthy Amma [8] the current consensus among Indologists is to assign these texts the period 800–400 BCE. Baudhāyana Śulbasūtra is the oldest, formulated around 8<sup>th</sup> C. BCE (History of Dharmasastras, Introduction P. V. Kane). The other Śulbasūtra are composed around the next 400 years or so.

## 2. Vedic tradition of Kerala

### 2.1. Oral tradition

The Vedic tradition of Kerala with its associated rituals are preserved by Nambudiries; the Kerala Brahmins. The tradition is relatively small but quite different from the rest of India, and entirely self contained [12]. The three Vedas Rgveda, Yajurveda (Krsna and Śukla) and Sāmaveda, are followed in Kerala. The Kerala Jaiminiya Sāmaveda School is the only surviving school of that particular branch of Veda. The Vedas are transmitted orally across the generations. In fact the Kerala Vedic chanting style is listed in the Intangible Cultural Heritage of Humanity of UNESCO.

The value of this tradition lies not only in the rich content of its oral literature but also in the ingenious techniques employed by the instructors in preserving the texts intact over thousands of years. To ensure that the sound of each word remains unaltered, practitioners are taught from childhood, complex recitation techniques that are based on tonal accents, a unique manner of pronouncing each letter and specific speech combinations.

(<http://www.unesco.org/culture/ich/index.php?pg=00011&RL=00062>, retrieved on 27/6/2010)

### 2.2. Extant vedic rituals of Kerala

Apart from Ādhānam, whose performance is mandatory to perform other fire rituals, Kerala Nambudiries perform two types of fire rituals (In the Tamil Sangam literature, there is reference to Vajapeya Yāgam having been performed during the second century BCE in Perinchellur Gramam near Taliparamba in the present Kannur district. So, performances of other Yagams by Nambudiries during the earlier periods cannot be ruled out). They are Agnishtomam (Somayāgam) and Athirāthram (Agni or Agnichayana). These rituals are so common that, in the last 175 years or so around 200 Somayagams and 23 Agnis were conducted in Kerala (For a comprehensive list, refer to <http://namboothiri.com/articles/yaagam.htm>).

### 2.3. Regional texts pertaining to Śulbasūtras

All major Vedic texts along with ancillaries has been adapted for local use and transliterated in Malayalam script [5]. In addition to this there are independent works on Vedic rituals. Prominent among them is a set of texts called yāgam bhasa and Agniyude bhasa, which explains the Vedic rituals in Malayalam language. This text has local variations (Mantras for chanting will be same, but rituals may be more or less from other versions) depending on the family of Vaidikan who supervise the Vedic rituals (Generally two variations viz. Taikkat and Cherumukku). Parikarmam, is a hand book for vedic rituals including Yagam and Agni. This gives the details of ritual enclosure and fire altar.

Another text worth mentioning is the Kārikās of Yogiyār. These are Sanskrit verses which gives the construction of yāgasāla and the details of Agni ritual. There are three kārikās, (one each for square falcon, falcon with five set of nail and one with six set of nails) which explains the details of the three most common forms of Agni practiced in Kerala. These karikas are composed by an ascetic from Taikkat Mana of Covvaram grāmam (The period of the work is 16c. CE as per Ulloor S. Parameswaran). His actual name is Nilakantan Nambudiri. In fact the Karikas of Yogiyar are the only known independent work in Sanskrit of post Śulbasūtra period, which deals with fire altars (Information provided by Prof. (Dr.) Neelakanthan, Head, Dept. of Vedic studies, Sree Sankara University, Kalady, Kerala).

### 3. Uniqueness of Śulbasūtra tradition in Kerala

#### 3.1. Introduction of extended units

Śulbasūtras uses two types of units, absolute ones, related to natural lengths (millet or sesame seeds, etc.) and relative units (such as the height of a given person), explicitly stated as variable. Rule (BS, I.18) (There is liberty regarding the length of pada, yuga, prakrama, aratni, and śamyā, if these words denote measures. (BS, I.18)) express that some measures, including the purusa, are not absolute, and may be redefined as need be. There are two reasons for the variability of the measure, apart from possible cases of actual polysemy.

First, ritual requires the construction of increasingly larger structures that differ only in area, but not in shape. This is clear from the following sūtras.

1. The Agni has an area of seven and a half square-purusas, when it is constructed for the first time (BS.II.1)
2. Eight purusas and a half form the second Agni BS. (II.2) and so forth.
3. Rule (BS.II.12) explains that increase is achieved by redefining the purusa.

The excess (to be added) to the original form should be divided into 15 parts and two parts be added to each fold (of one sq. purusa) [A rule to perform this addition is given in (BS.I.50)]. Second, in ritual, the units may be defined by the physical characteristics of the actual person for whose benefit the ritual is being performed (the yajamāna). Thus, MS. 5.2 reads:

A bamboo rod equal to the length of the sacrificer with uplifted arms (120 *angulas*) is measured out.

In line with the above mentioned rules, the sulbavids (Experts of Śulbasūtra based constructions ) of Kerala propose two extended units. They are Madhyama prakrama [MP] and Vrddha prakrama [VP]. These are the extended forms of normal prakrama

[called Bāla prakrama in Kerala, BP]. The value of these new units for six nail falcon altar is (These values will change for a five nail falcon altar. In this case, Vrddha prakrama is  $35 \frac{2}{3}$  angulams)

1. Madhyama prakrama =  $32 \frac{1}{4}$  viral (Malayalam for angulam)
2. Vrddha prakrama =  $34 \frac{1}{3}$  viral

These extended units are introduced to contain the newly constructed gārhapatyam and uttaravedi within pracinasāla and mahāvedi respectively.

### 3.2. Introduction of new units

The text also introduces a new unit called viral of muzakkol ( $V_M$ ) (This can be compared to muzakkol, a measuring stick used in the stone sculpting and in house construction of south India (muzam in Tamil means half of an arm's length and kol means stick). In stone sculpting practice, one muzam is considered to be of several "finger widths". Different muzam have different finger widths namely, 24, 25, 26, 27, 28, 29, 30 and 31 viral). In this case one viral is equal to two angulam. One Muzakkol contains 24 viral. Muzakkol is also known as āsarikkol (meaning, the carpenters stick). The units  $V_M$  and Muzakkol are used by staphyths in Śilpasāstra and Vastusāstra. The new units point to the remote connection between this knowledge systems and Śulbasūtra tradition (The kuti (hut) for rasayana treatment of Ayurveda in Kerala is constructed based on the measurement of the patient. This, points to another connection between Vastusastra and Śulbasūtra tradition (information provided by Dr. Krishnakumar, The Arya Vaidya Pharmacy, Coimbatore).

### 3.3. Unique measuring instruments

In addition to the measuring instruments mentioned in Śulbasūtras, we find some peculiar instruments in Kerala tradition. They include

1. Strips of coconut palm leaves of specific length like 1 aratni, used for practical measurement (This can be compared to the Odiolai, a strip of the leaf of a coconut tree which is used as a tool for measuring and fixing the various dimensions of the icon that is being cast using lost wax method, in southern India. Markings on the Odiolai are made by initially folding the leaf-strip into two and this process is continued successively so as to get a variety of markings in the proportions 2, 4, 8, 16, 32 and 64. These proportionate markings are used for fixing the dimensions of the various parts of the icon that is cast).
2. Prepared cords, with several knots, to serve as the markings for different units. The cords along with wooden pegs are used to mark the dimension of yāgasāla. One such code is mentioned in a katapayādi sloka (Mentioned in a Malayalam work called 'Marancheri Bhasa', available in Taikkat Mana, Edappal). This particular cord of 12 prakrama length is used in the construction of pracinasāla (Figure 1). The different knots on the cord are represented by letters A to M.



Figure 1.

3. A bamboo scale with markings of

- a. Pādam - 15 angulam
- b. Aratni - 24 angulam
- c. Prakramam - 30 angulam

This small scale served for the purpose for measuring different parts of falcon fire altar.

### 3.4. Dimension of pracinasāla and mahāvedi

The outer dimension of pracinasāla is 18, where as the sulbasutra proposes it as either 16 prakramas. The increased length and the use of extended unit may be to enclose the newly constructed gārhapatyam altar within pracinasāla.

### 3.5. Introduction of patnisāla

On the western side of pracinasāla an annexure called patnisāla is erected. This serves as a private enclosure for Yajamana's wife and family members. Experts attribute this, to the privacy enjoyed by Nambudiri women of Kerala (Nambudiri women are called Antarjanam, literally meaning 'who stays inside'). Another explanation is based on the temple architecture of Kerala (Earliest forms of temple architecture are visible in the design of Fire altars). Kerala Nambudiries are followers of Siva. There is a practice in Kerala, to install Devi's idol in the obverse of sanctum sanctorum of Siva temples. Here the pracinasāla is compared to the sanctum sanctorum of the temple and patnisāla to the portion of the sanctum sanctorum where, the Devi's idol is installed (Information furnished by Taikkat Vaidikan Kesavan Nambudiri, Ayyanthol, Thrissur).

## 4. The text under study 'Agniyude kanakkukal'-the measurements of Agni

### 4.1. Introduction

The manuscript titled 'agniyude kanakkukal' are available in two forms (The text as such gives no title, but the wooden frames of the palm leaf manuscript kept at Pandal Mana contains this title). Two paper manuscripts kept at Taikkat Mana of Edapāl, Malappuram and one Palm leaf manuscript at Pandal Mana, Rāpal, Thrissur. One of the paper manuscripts is an incomplete copy of the other. From the contents and practical approach followed, it is assumed that, this is an independent translation of the Kārikās of Yogiyār (It is interesting to note that, the ascetic who composed Karika belongs to the same family; from where two manuscripts of the text under reference are found (Taikkat Mana, Edappal)). The period of composition is c. 1750 CE (Information furnished by Taikkat Vaidikan Kesavan Nambudiri, Ayyanthol, Thrissur).

## 4.2. Contents of the text

The text start with the instruction to prepare ‘dandu’, the measuring rod whose length is equal to the height of a person, with hands uplift. Then the different sub units like Janu, Aratini, Bala Prakram, the extended units, the measure of bricks (of fire altar, and of two types of gārhapatyam and Dhisnya). Separate measurement for ‘panchapatrika’ and ‘shalpatrika’ are explained. This is followed by the number of bricks in each layer of the altar.

## 4.3. Findings from the text

### 4.3.1. New definition of Angulam

#### 4.3.2.

The text gives a new subunit of Angulam as 1 viral = 8 thora, a type of grain. Same unit is mentioned in Lilavati of Bhakara-II.

### 4.3.3. Derivation of extended units

Derivations of extended units are given very clearly.

- The derivation for MP is as follows  
Take one fourth of a cord equivalent to the length of BP. The three tenth of this should be added to the BP. This will be the extended unit MP. This is common for panchapatrika and shalpatrika. This is equal to  $32\frac{1}{4}$  Viral.

$$30 \times \frac{1}{4} \times \frac{3}{10} + 30 = 32\frac{1}{4}$$

- The derivation of VP of ‘shalpatrika’ Subtract one third of Balaprakrama from a cord of length 3 Pradesa. One sixth of the remaining is to be added to the Bala prakrama to get the VP.

$$(3 \times 12 - 10)\frac{1}{6} + 30 = 34\frac{1}{3}$$

### 4.3.4. Ways of getting the basic measuring unit- ‘Prakrama’, special instruction

There is a prohibition on using Yjamana’s foot to measure the size of Prakrama. In Somayaga, the length of two foot is considered as one Prakrama. But this practice is prohibited in Agni.

### 4.3.5. Use of Katapayadi numeral system

The Katapayādi system is an ancient method of alphabetical notation where each consonant of the Sanskrit alphabet is given a numerical value. The system is described in an anonymous line thus: kādi nava, tādi nava, pādi pancha, yādy asta, ‘the nine [consonants] starting with *ka*, the nine starting with *ta*, the five starting with *pa* and the eight

from *ya* [successively denote the numbers 1 to 9]. But the line does not say how the zero is to be represented. The *Sadratanmla*, composed by SankaraVarman in 1819 CE, gives a more comprehensive definition:

*na, nana* and the vowels are zero. The letters (of the consonant groups) commencing with *ka, ta, pa* and *ya* are digits. In conjunct letters the last consonant is to be taken as the digit. A consonant not attached to a vowel is to be ignored.

Though neither of the definitions explicitly states, the numerals represented in this system are read from the right to the left. The earliest occurrence of this notation is in the *Candra Vākyas* of Vararuci who is said to have lived in the 4<sup>th</sup> c. CE. However, the first positive and datable occurrence is its use by Haridatta in his *Grahacāranibandhana*, composed in 683 CE [7].

In the text the *Katapyādi* system is used to list the number of bricks in each layer of the fire altar. For example the number of different bricks in the second layer of 'shalpatrika' is given by the sloka

Paya/Priya/Payo/Ratnam/Kaura/Saste/Bhaga/Tanu/Dura/Dane:  
Kramal gobhiyojayel parasciti.

Meaning: (for second layer) 11 panchami, 12 panchamiardhya, 11 padya, 2 ash-tamsi, 21 sapāda, 67 adhyardha, 6 sulapadya, 34 adhyardhardhya, 28 dirgapadya and 8 ubayi bricks are to be arranged.

#### 4.3.6. *Thickness of the bricks-some of which are not mentioned in BS*

The thickness of the bricks are mentioned indirectly in BS by giving the total height of altar as 32 angulam(one Janu) [BS, 2.13]. In this text, thicknesses of all types of bricks are mentioned directly. It gives the height of ordinary bricks as janupanchamam (32/5) and the special bricks as janudasamam (32/10) angulam (10 special bricks of half the thickness is constructed. This is to make the total number of bricks in five layer as 1005, without altering the design of each layer).

#### 4.3.7. *Specification of brick sizes-practical approach*

While specifying the brick size, the approach is very practical (In fact the inner dimensions of the frame for the bricks are given). All brick size is derived from the base brick [panchami for shalpatrika and chaturasri for panchapatrika]. Once the frame of base brick is constructed, this will ensure the easy construction for all other bricks. This is particularly relevant in a region, where the fire rituals are very common.

Specification of various bricks for shalpatrika

Panchami bricks have length and breadth of one aratini each. Its thickness is Janupanchamam. To construct ardhya, divide panchami diagonally. Both the ardhya

are of triangular shape (Here the length of third side of the triangle is given as 33 viral, 2 thora and 3 1/4 ellu). Instead to get Padya bricks, split the panchami to four parts along two diagonals. This will give four padyas of triangular shape.

## 5. Conclusion

The contents and new findings of the text including, new units, derivation of extended units, use of Katapayādi numeral system, and practical approach to brick construction are discussed in brief. Use of certain instruments and units points to the relationship of Śulbasūtra tradition to other branch of knowledge like Silpasāstra and Vastusāstra. More study need to be done to find the interrelationship between these technical sciences and the influence of latter on former. This shall be pursued in the future.

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## REFERENCES

- [1] Anand Raman, The ancient Katapayādi formula and modern hashing method, <http://ieeexplore.ieee.org/>
- [2] Dr. A. K. Bag, Vedic Mathematics, paper presented in the seminar "Indian contribution to world civilization" at Institute of Oriental study, Thane, 2005 Where gods come alive, Baldev etc, Vigyan Prasar, New Delhi, 2000
- [3] B. Datta, The Science of Sulba, Study in early Hindu Geometry, Calcutta University, 1932
- [4] Robert Gardner, Frits Staal, Agni-altar of fire, documentary, Extension media centre, UC Berkeley.
- [5] Dr. V. Govindan Nambudiri, Sruta sacrifices in Kerala, University of Calicut, 2006
- [6] S.D. Khadilkar, Katyayana Śulbasūtra, Vaidika Samsodhana Mandala, Pune, 2003
- [7] S. R. Sarma, Katapayādi notation on a sanskrit astrolabe, IJHS, 34(4), 1999

- [8] Dr. T. A. Sarasawthy Amma, Geometry in ancient and medieval India, MLBD, New Delhi, 2007
- [9] Prof. (Dr.) Satya Prakash, Geometry in ancient India, Govindram Hasanand, New Delhi, 1987
- [10] Satyanad Kichenassamy, Baudhayana's rule for the quadrature of the circle, Historia Mathematica 33 (2006) 149–183
- [11] S. N. Sen and A. K. Bag, Sulbasūtras, INSA, New Delhi, 1983
- [12] Frits Staal, Agni Vol-1 and Vol-2, Asian Humanities Press, Berkeley, 1983