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# PROOF FOR
# FEW INDIAN DISCOVERIES

DR.N. GOPALAKRISHNAN Ph.D.; D.Lit

(Scientist, [redacted])

INDIAN INSTITUTE OF SCIENTIFIC HERITAGE
THIRUVANANTHAPURAM 695 018

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# INDIANS DISCOVERED THE SIZE, SHAPE, ROTATIONS & GRAVITY OF EARTH

It has been taught the shape, size, rotation, revolution, path of revolution, gravity and other parameters of the globe earth were discovered by Copper Nicus, Galileo, Kepler and Newton. Of course they were great scientists who discovered many scientific facts. But the above information attributed to them are really Indian discoveries ! Look into the explanation given in Aryabhateeya written during 499 AD, by Aryabhatta I.

**Shape of earth** : *Mruth jala sikhi vayumayo bhoogola: sarvatho vruttha* : (iv. 6) : The globe earth, composed of water, soil, fire, and air is spherical in shape and circular on all sides

**Deifinition of globe** : *Kaashtamayam samavrutham samanthatha : samagurum laghum golam paarada thailajalaistham bhramayeth svadhiyaa cha kaalasamam* (iv ; 22)

The golayanthra (globe) is made of wood, perfectly spherical, uniformly dense and light (in weight). It should be rotated keeping pace with the time using mercury, oil and water by the application of one's own intellect.

**Diameter of earth :** *njila bhoo vyasa:* (I;7) Diameter of earth is 1050 yojana (in Aryabhateeya number : nja = 10, nji = 1000, Ia = 50 : nji + Ia = 1050). (one yojana is approximately 12.11 km (*nar shi yojana* = 8000 times the average height of a man)

**Rotation of earth** : *Ku aavarthaaschaapi naakshathraa* (iv : 5): Due to the rotation of earth days (sidereal) are formed.

*Praanenaithi kalaam bhoo* (I:6) : The earth rotates through an angle of one minute of an arc during the time for one respiration (*praana* = time taken for one respiration = 4 sec.)

**Number of rotation of earth in one Mahayuga** (Mahayuga = 4320000 years); *ku ngi si bunlru shru khru praak* (i : 3) : The

number of rotation of earth is 1,58,22,37,500

**Why we see the Sun moving from east to west?:**

*Anuloma gathirnoustha : pasyathi achalam vilomagam yadvath achalaani bhaani thadvath samapaschimangaani lankaayaam (iv : 9)*

Just as a man in a boat moving forward sees the stationary objects (on either side of the river) as moving backward, just so are the stationary stars seen by the people in equator (Lanka) as moving exactly towards the west.

**Period of sidereal rotation of earth :** According to Aryabhatta I the period of sidereal rotation of earth is 23 hrs 56 min. 4.1 sec modern value 23 hrs. 56 min. 4.091 sec.

**Sidereal period in days for earth for one revolution around the Sun :** According to Aryabhatta I 365.25868 and the modern value 36.25636.

**The greatest declination of Earth :** *Bhaa apakramo grahaamsaa:* (I.8) The greatest declination of earth is 24° (Modern value is 23.5°)

**Four quadrants of earth :** (iv : 13) and how the Sun looks from there

*Udayo yo lankaayaam so asthamayo savithureva siddhapure maddhyahno yavakotyaam romake vishaye ardharaathram syaath*

When it is sunrise in Lanka, the same sun sets in Siddhapura (Guatemala) in Yavakoto (may be Korea) it is midday and in Rome it is mid night.

**Eclipse :** There was a clear understanding on the eclipses in the perfect astronomical sense.

*Cchadayathi sasi sooryam sasinam mahathi bhoocchayaa (iv : 37) sphuta sasi maasaanthe arkam paathaasanno yadaa pravisatheendu: (iv : 38) Bhoocchaayaam pakshaanthe thadaadhikonam grahna madhyam*

The Moon eclipses the sun and great Shadow of the Earth eclipses the Moon. When at the end of a lunar month, the Moon,

lying near a node enters the Sun or, at the end of a lunar fortnight enters the Earth's shadow, it is more or less the middle of an eclipse.

Aryabhatta I is the first to explain the spherical shape, size, diameter, rotation and correct speed of Earth. Astronomical information clearly mentions the eclipse unlike puranic stories. The four quadrant of the earth is well known. These explanations are given 1000 years before Kelvin. Galileo, Sir Issac Newton and Copper Nicus.

Another history tells us that when Columbus went in search of the Indian continent, hundreds of his fellow sailors jumped into the sea, thinking that they are going to reach the end of the flat earth and fall into the purgatory as mentioned in bible.This is not a story but a historical incidence. Galileo was tortured by Priests in the West, but not Aryabhatta in India.

## HERITAGE DISCOVERY SERIES - 2

### MAHARSHI SUSRUTHA DISCOVERED PLASTIC SURGERY - HOW IT WENT TO WEST

(Prepared from the publication of the magzine 'dream' written by Gunakar Muley page 2047)

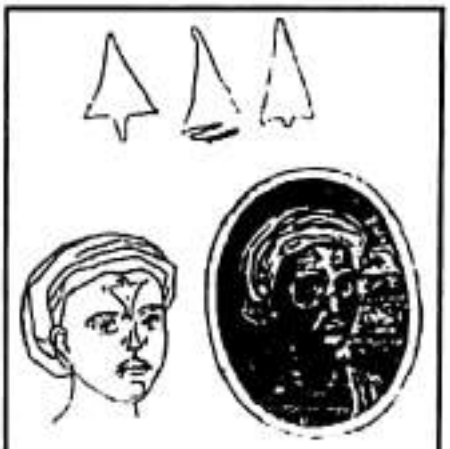
During 1769 - 1799 AD there was series of wars between HyderAli and the British. A Maratha cart driver, kawasajee, who had served the British and Indian soldiers in the British army had fallen into the hands of the Sultan. His nose and right arms were cut as punishment. After some days an English commanding officer noticed a merchant with a peculiar nose and scar on the forehead. On enquiry, the officer leaned that a substitute nose was made by a Maratha Vaidya of Kunhar (potter) caste, and fixed on the merchant. The commander got the nose of Kawaasjee also reconstructed with the help of the Vaidya. The operation was performed near Pune in the presence of two English doctors: Dr. Thomas Cruso and Dr. James Findlay. An illustrated account of

this operation carried out by an unnamed Vaidya, appeared in the magazine namely Madras Gazette. Subsequently the article was reproduced in the Gentleman's magazine of London in October 1794. (It is reproduced in this paper also). The operation is described as follows:

"A thin plate of wax is fitted to the stump of the nose so as to make a nose of good appearance, it is then flattened and laid on the forehead. A line was drawn around the wax, which is then of no further use, and the operator then dissects off as much skin as it has covered, leaving undivided a small slip between the eyes. This slip preseves the blood circulation till a union has taken place between the new and the old parts. The cicatrix of the stump of the nose is next paired off, and immediately behind the new part, an incision is made through the skin which passes around both alae, and goes along the upper lip. The skin, now brought down from the forehead and being twisted half around is inserted into this incision, so that a nose is formed with a double hold above and with its alae and septum below fixed in the incision. A little Terra Japonica plant product is softened with water and being spread on the slips of cloth, five or six of these are placed over each other to secure the joining. No other dressing but this cement is used for four days. It is then removed and cloths dipped in ghee are applied. The connecting slip of skin is divided about the twentieth day when a little more dissection is necessary to improve the appearance of the new nose, For five or six days after the operation, the patient is made to lie on his back and on the tenth day bits of soft cloth are put into the nostrils to keep them suffciently open. This operation is always successful. The artificial nose is secured and looks nearly as well as the natural nose, nor is the scar on the forehead very observable after a length of time."

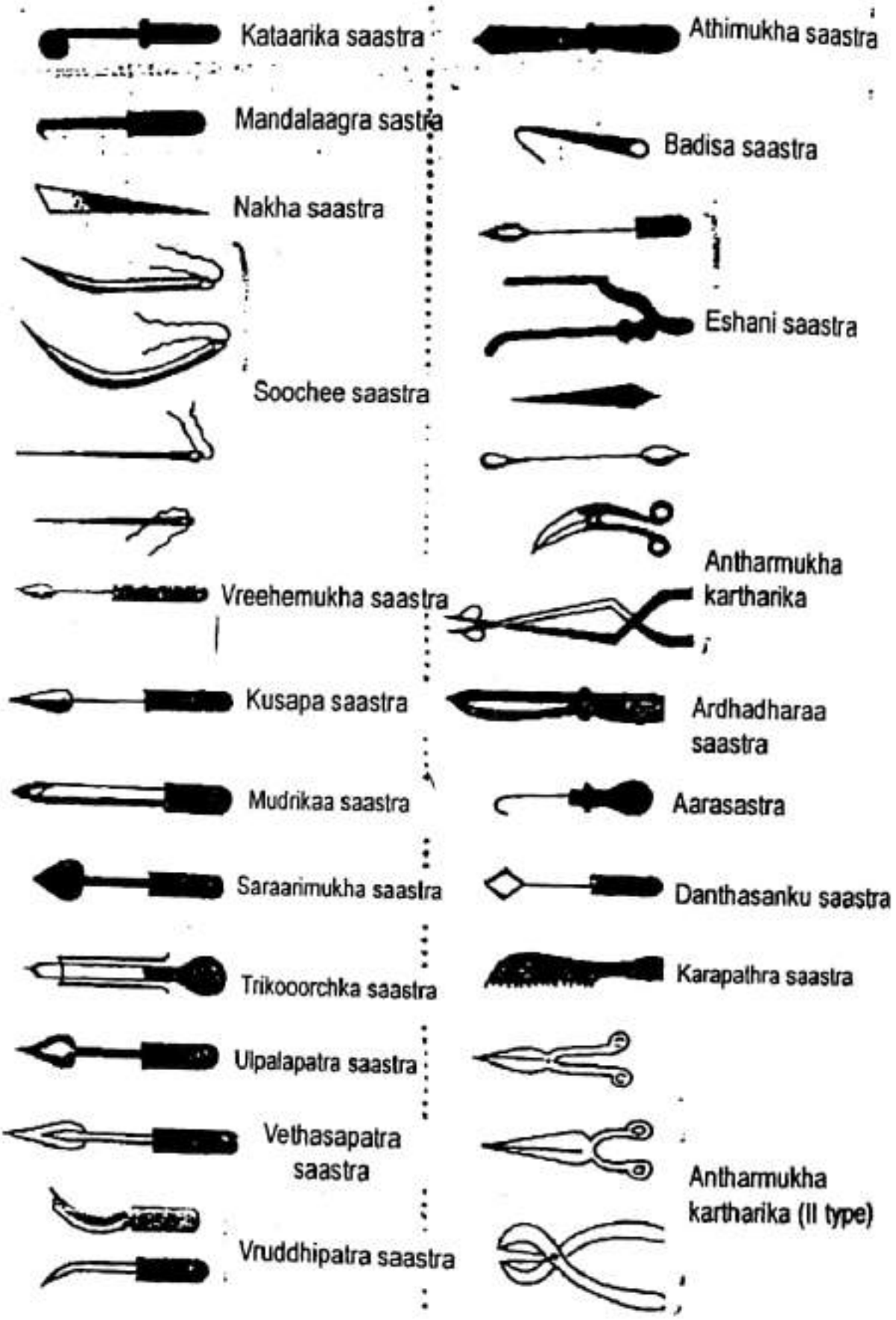
This description fired the imagination of young English sugeon J.C. Carpue, who after gathering more information on the Indian nose performed two similar operations in 1814 and published

the report. After then a German surgeon Graefe performed this operation of the nose using the skin of the arm. After this, plastic surgery became popular in Europe. This was known as Indian Plastic Surgery! After getting fresh impetus from India plastic surgery had great progress in the past two hundred years. In 1933, the first international congress of plastic surgery was held in Paris. Plastic surgery is thus explaied in Susutha Samhitha, the 16th chapter, of suthrasthaan: The portion of the nose to be covered is first measured with a leaf. Then a piece of skin of the required size should be dissected from the living skin of the cheek, and turned back to cover the nose keeping a small piece attached to the cheek. The part of the nose to which the skin is to be attached should be made a raw by cutting of the nasal stump with a knife. The physician then should place the skin on the nose and stitch the two parts swiftly, keeping the skin properly elevated by inserting two tubes of eranda (the castor oil plant) in the position of the nostrils so that the new nose gets proper shape, the skin is thus properly adjusted. It should then be sprinkled with a powder compose of liquorice, red sandal wood and barberry plant. Finally, it should be covered with cotton and clean sesame oil should constantly applied to it. After some days the wound heals up and the grafting is successful. Susrutha also mentions the reconstruction of the broken lip and harelip..... Thus the Susrutha Samhitha written before 600 BC has the clear explanation and in India up to 18th Century this was performed on large scale by experts. HENCE Plastic Surgery is ancient Indian discovery. In 1793, the Maratha Vaidya constructed the nose of a merchant. This illustration published in Gentleman's magazine (London) on October, 1794.

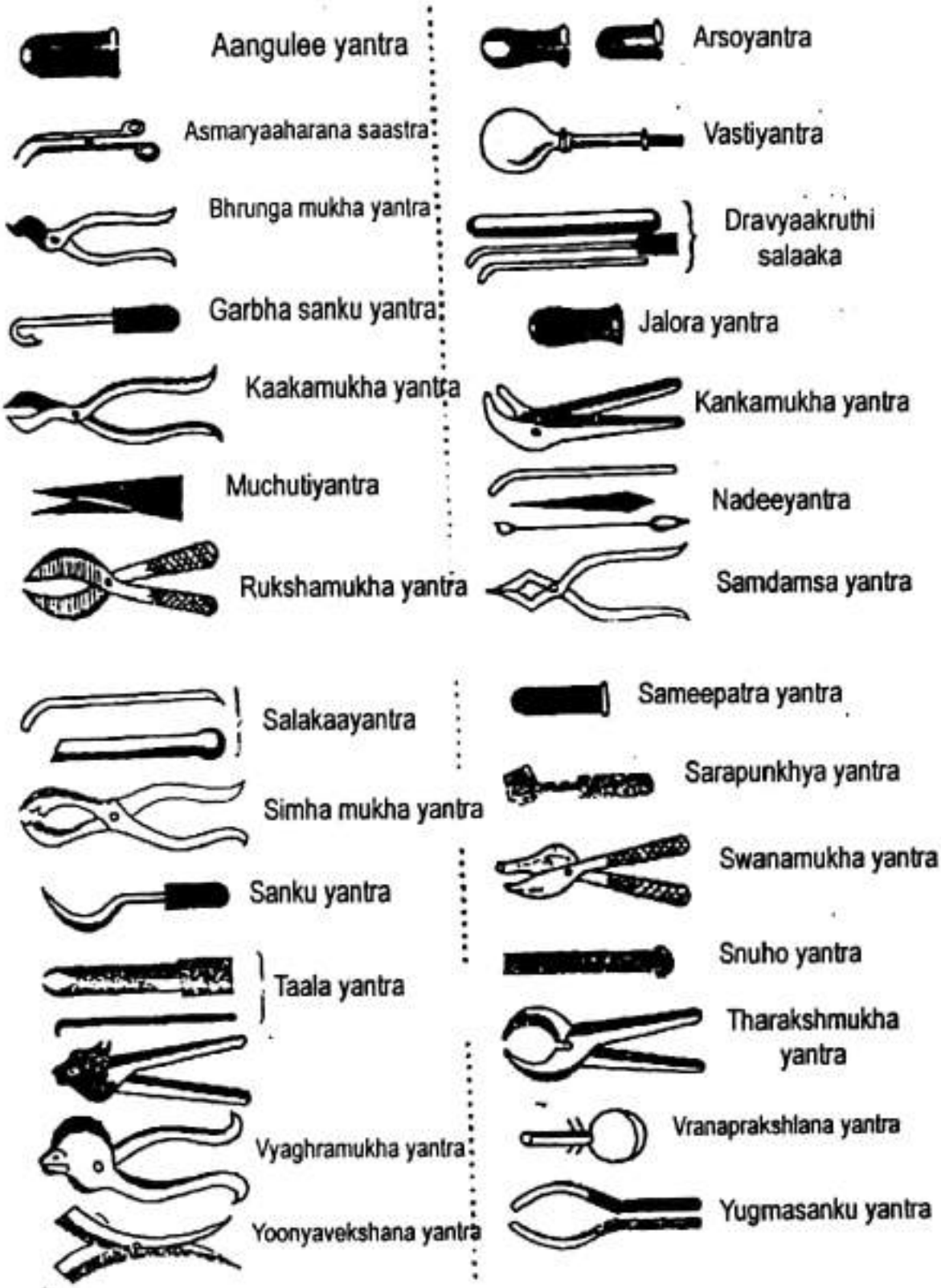


In 1793, A Maratha Vaidya reconstructed the nose of a cart-driver, Illustration from "Gentleman's Magazine" (London), Oct. 1794

# The Sastra Type of Instuments used for Surgeory



# Yanthra Type of Instuments used for Surgeory



# PYTHAGORUS THEOREM IS ANCIENT INDIAN DISCOVERY

Bhouddhayana Sulbasuthra written during 800 BC, not less than 300 years before Pythagorous gives a clear explanation on the theorem. Proofs and examples are given on this theorem by Bhoudhayana. Sulbasuthras written by Apasthamba and Katyayana, who were lived before Pythagorus, also contain with examples the theorem now known in the name of Pythagorus:

**Bhouddhayana sulbasutra quotations:**

*Deergha chathurasrasya kshnya rajju: paarsvamaanee tiryanmaanee cha pruthak bhoothe kuru thasthath ubhayam karoti (1.12)*

Area of the quare produced separately by the length and the breadth of a rectangle together equal to the area produced by the diagonal.

*Thaasaam trika chathushkayo: dvaadasika panchakayo: panchadasika ashtikayo: saptika chathurvimsathikayo: panchadosika thrimsathikayo : ithyethaasu upalabdi: (1... 13)*

This is observed in rectangles having sides 3 and 4, 12 and 5, 15 and 8, 7 and 24, 12 and 35 and 15 and 36 (Dagonal measurements will be in non fractions for these pairs of lengths and breadths)

*Samachathurasrasya kshnayaa rajju: dvishtaavathim bhoomim karothi (1.9)*

The diagonal of a square produces double the area (of the square)

**Apasthamba Sulbasuthra quotations**

*Deergha chathurasrasya kshnayaa eajju: paarsvaamaani cha yathpruthak bhoothe kuru thasthath ubhayam karoti. Thaabhirjneyaabhiruktham viharanam (1.4)*

The area produced separately by the length and the breadth of a rectangles together equals the area produced by the diagonal. By the understanding of these, the construction as stated is accomplished

*Chaturasrasya kshnaya rajju: dvishtaavathim bhoomim karoti. Samasya dvikarani (1.5)*

The diagonal of a square produces double the area. It is square roof of 2 (dvikarni) of the side

*Trika chatushkayo: panchika kshnayaa rajju:*

The disgonal of a square produces double the area. It is square root of 2 (dvikarni) of the side Trika chatushkayo: panchika kshnayaa rajju:

The diagonal of a rectangle of sides 3 and 4 is 5;

*Dvaadasika panchikayo : thrayodasika kshynayaa rajju: Thaabhiramsow dvirabhyastahaabhi: strong (5.4)*

The diagonal of a rectangle of sides 12 and 5 is 15. With these the two estern corners of the altars and with these increased by twice themselves, the two western corners are determined.

*Pachadasikashtikayo: saptadasika kshnayaarajju: sroni. Dvaadasikapanchathrimasathikayo: sapthatrimsathika kshnaya rajju: thaabhiramsow(5.5)*

The diagonal of a rectangle of sides 15 and 18 is 17. The diagonal of a rectangle of sides 12 and 35 is 37. With the former estern corner and with the latter eastern corners are fixed for the altars

**Katyayana sulba sutra quotations**

*Paada, tiryanmaani tripaada parsvamaani thasya kshnayaa rajuu: dasakarni (2.4)*

The hypotenuse of the right triangle of which has the breadth 1 pada unit and height 3 pada unit is square root of 10 (dasakarani)

*evam dvipadaa tiyanmaani shatpadaa paarsvamaani thasyakshnayaa rajju: chathvaarismath karanai.*

Similarly the hypoteneuse of the right triangle, of which the

breadth is 2 pada unit and the height is 6 paada unit, is square root of 40 pada unit (2.5)

There are many evidences to how that Indian knowledge was utilised by Pythagorus (540 BC) in formulating this theorem. He did not give even the proof for and it was given by Euclid (300 BC) in the west. The theorem has been discussed in detail by Burk who concluded that "Pythagorus theorem was known and proved in all its generality by the Indians long before the date of Pythagorus". During the period of Pythagorus many books written in Europe had borrowed Indian knowledge. Indian medical prescriptions and theorems can be seen in Hippocratic collections, Plato's Timaeus and writing of Roman Physicians and encyclopedia such as Celsus, Scribonius Largus, Plyni, and dioscorides. Thus the knowledge has gone from India and as shown above, with example the theorem was applied in the construction of the altars, in books written 300 - 500 years before Pythagorus. Even the others knew about square root only after the 10th century AD. But Bhoudhayana has given even the method to determine the square root of 3.

**HERITAGE DISCOVERY SERIES - 4**

## ANCIENT INDIAN DISCOVERY OF ZINC EXTRACTION PROCESS

In ancient India the production of the Zinc metal was very common. Many kilns used for the production of the zinc can be seen even now in the Rajasthan zinc mine sites of Zawarmaala. Those kilns were active even during 1000 - 1300 BC. The zinc extraction technology is an **ancient Indian contribution to the modern world**. The knowledge went from here to west. How the technology was taken to the West is traceable.

In 1597, Libavius a metallurgist in UK received from India some quantity of zinc metal in its pure form which was unknown to the West till then. The proof of the ignorance of this metal is

clearly available because till 1751 AD Postlewayt's Universal Dictionary, (which was the most authentic source of all technological information in Europe) did not mention anything on zinc. Libavius named it as Indian / Malabar lead. He was not sure what the metal was. Parcelius in 1616 AD is credited to have given the name zinc for this 'Malabar/Indian lead'. In United kingdom, William Champion of Warmley, U.K, experimented in his copper extraction device the technology for the production of zinc. He used the ore of zinc and followed the technology of Zawarmala, Rajastan and furnaces were also designed in the same way. This was during 1743. He conducted the experiment and applied for the patent on the production of the zinc from its ore calamine. The patent court went through the claim of Mr. Champion and reported that, the metallurgical technology was common in India and he was trying plagiarism. The wordings of the court explains that the zinc metallurgical technique was taken from India. "Champion was notoriously close with details of the Indian process of Zawar mines in Rajastan and possibly a third party described the general principle of the process to Champion" and the patent application of William Champion was rejected at first. Later Champion modified the design of furnace to some extent and got the patent for zinc production.

Mr. Beckman a scholar from the United Kingdom has reported that an Englishman has gone to India during the earlier of the 17th century to understand the process of production of zinc and returned with details of distillation of zinc metal from its ores. As a supporting proof of this information Prof. Poster writes like this "A Dr. Lane seems to have smelted zinc at his copper workshop in Sansea, as early as 1720 and this was done after vising Zawar (Zawar zinc mines in Rajastan) in India" This shows the zinc metallurgical process was taken from India.

Hence the Zinc metallurgy was discovered and applied on large scale in India. Hundred metre deep Zinc mines of south Lode when examined using $C^{14}$ dating technique has revealed the fact, that mine was active during 1260 BC. A Sheet of Zinc obtained

two decades ago. from a small town Agora, in Athens of Greece, has the inscription of Takshasila and belongs to the period 5 - 6 century B.C. Dozens of zinc extraction furnaces were found in different parts of Rajastan, many of them, dating about 1500 - 2000 BC. One such picture is given below dated about 500 BC Indian knowledge in zinc metallurgy is available not only from the mines, but also in Sanskrit books.

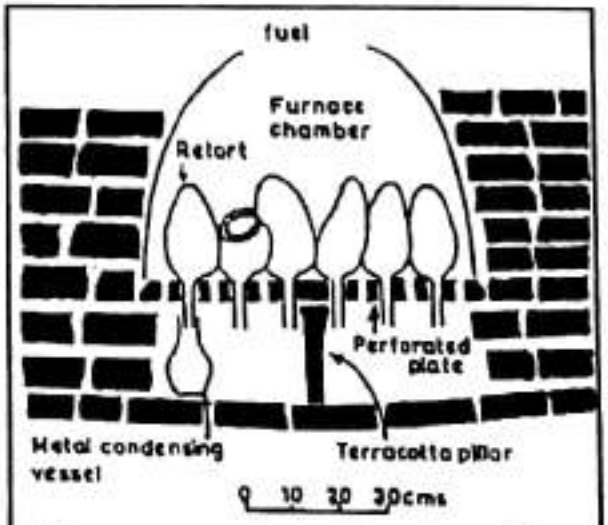
The Zinc metallurgy is explained in **Rasaratna samuchaya (10.22-23) thus**

*Vrunthaaka aakaara mooshaayaam naalam dvaadasakaangulam dathura pushpavath chaoordhvam sudruddam silaashtapushpavath astaangulam cha sacchidram saasyaath vrunthaaka mooshiko anayaa kharparaadeenaam mrudunaa sathvamaahareth*

Brinjal shaped crucible is attached with a 12 angula (one angula = 1.6 cm) long tube over it like an inverted flower of datthura (stramonium). A hole of a 8 angula is made in the tube. This crucible is used for the extraction of the zinc metal.

**Rasaratnaakara** (31, 32) explains thus : *Mookamooshaagatham tankanena samanvitham sathvam kutilasankaasam pathathe naathra samsaya:*

The metal obtained from the Mookamoosha (crucible) having the colour of tin is the essence, no doubt it is the zinc.



A cross section of ancient zinc distillation furnace excavated from Zawar

The Zinc mines of Rajapura, Dariba and Udaipur in Rajastan were found to be in their peak of extraction during 1330 BC. This results was obtained based on the carbon dating techniques. The brass obtained from Takshasila contained 34% zinc with copper, also.

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