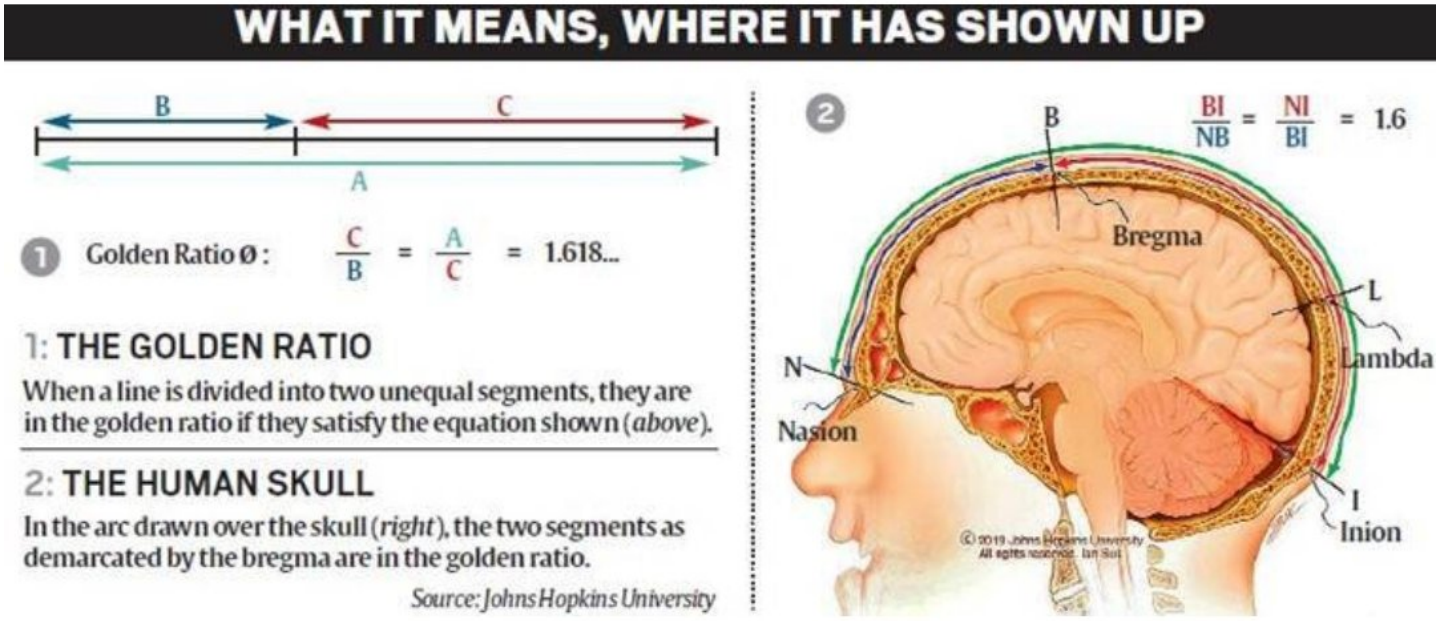
Twitter Thread by Vibhu Vashisth

Vibhu Vashisth
@VIBHU_Tweet

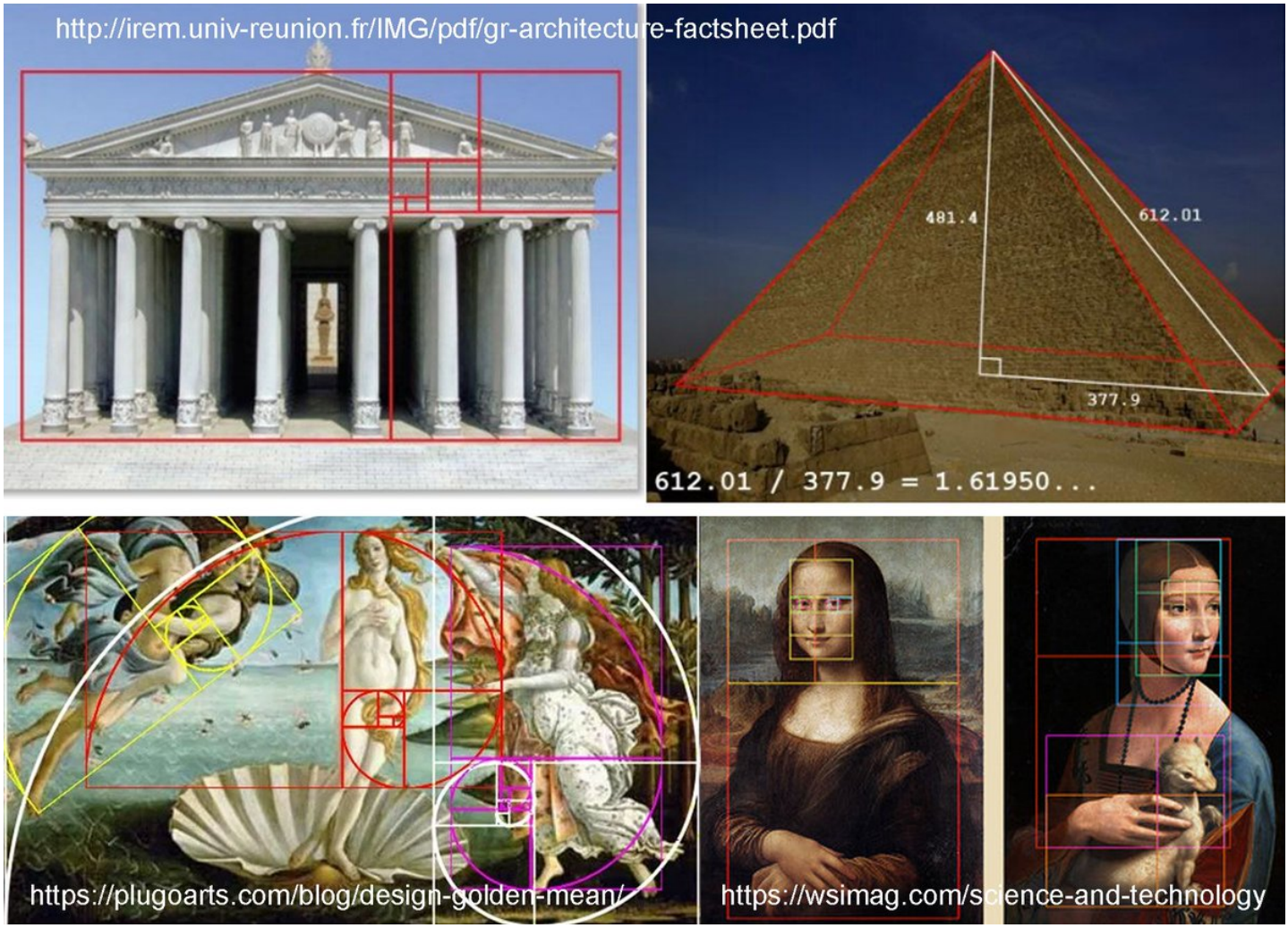
RISHI PINGALA:THE ANCIENT INDIAN SAGE DISCREDITED FOR HIS MAJOR CONTRIBUTIONS TO MATHEMATICS & PHI

Have you ever heard about,"The Golden Ratio"?
The Golden Ratio or Phi(Greek) is a mathematical ratio of nature. Mother Nature is the most exquisite artist in herself.



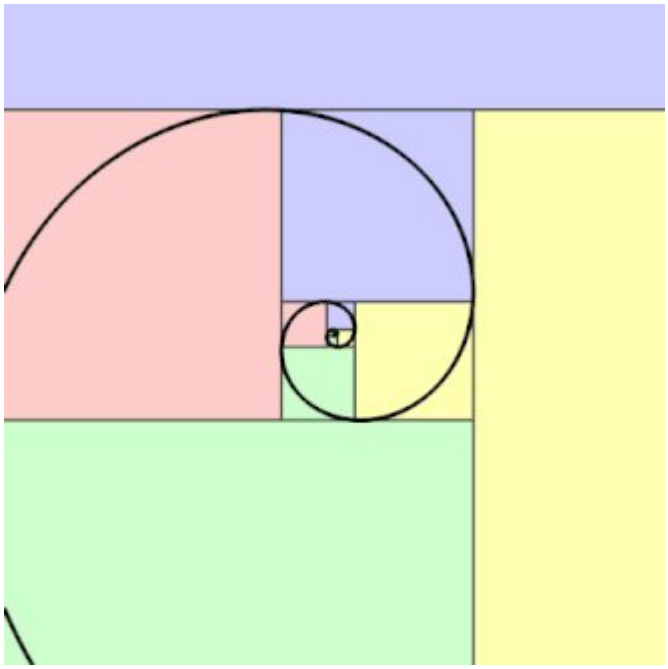
The golden ratio divides a line into two unequal parts as shown. The same ratio shows up in the human skull, when the arc over it is divided at the bregma. (Source: Johns Hopkins University)

&Its this Phi she uses to create all the beauty in World.
If anyone uses this ratio correctly in their art,it can turn into a spell-binding piece of work.Such is the significance of'Phi'.But my thread isn't about it.Its about somethin called'Fibonacci Series'&who actually made it

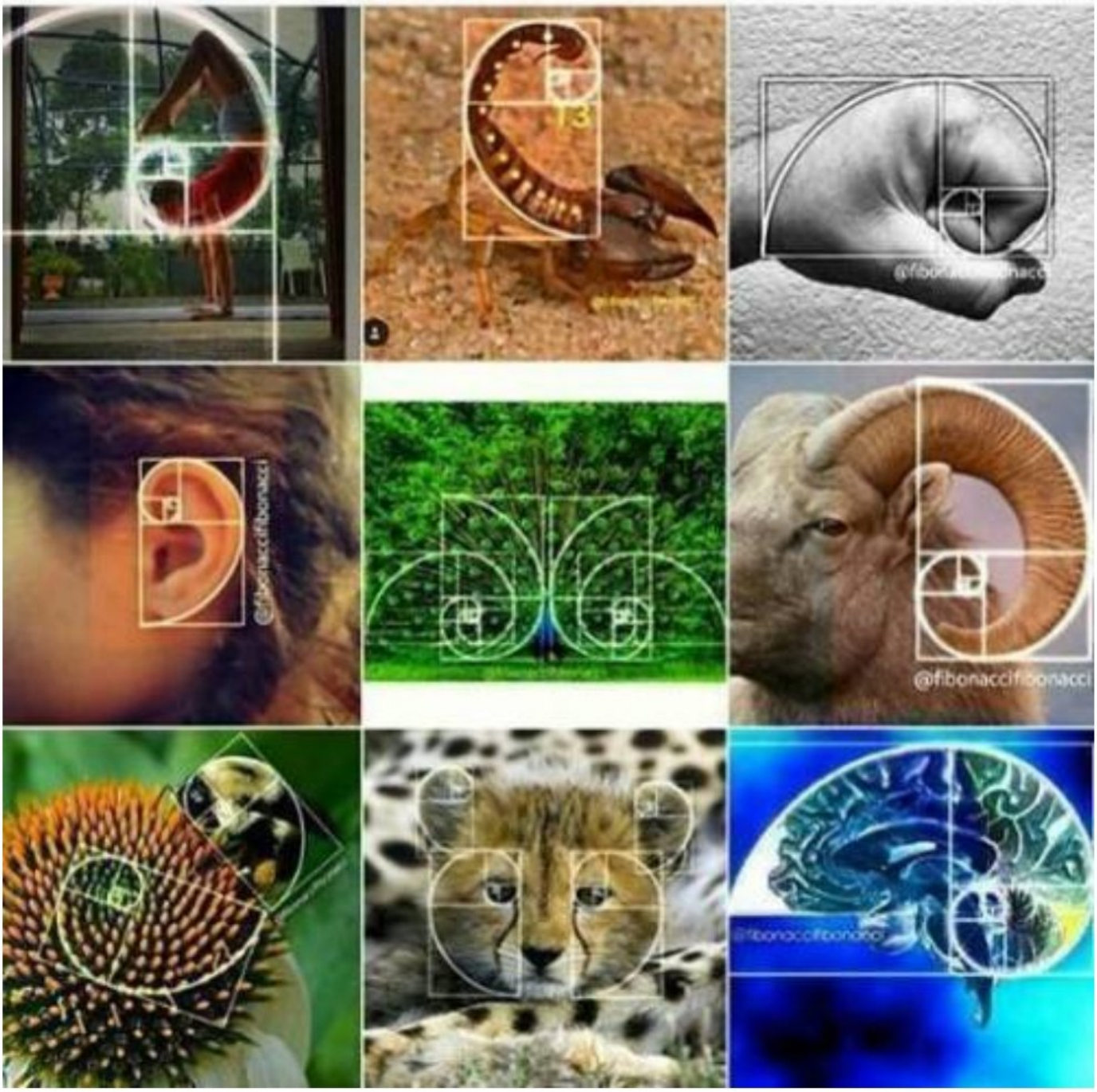


Phi is related to Fibonacci series(0,1,1,2,3,5,8,13,21,34...)
&this series is responsible for everything dat is beautiful on this planet. Just try to calculate the ratio of any 2 successive numbers ÷ each of them by the number before it in above infinite series.

E.g. 3/2=1.5, 5/3=1.666, 8/5=1.6, 34/21=1.61904 and so on. Did you notice something? The ratio is coming almost same every time. This ratio is called 'Phi 'which is numerically represented as 1:1.618. This Golden Spiral is made in exact proportion of 1:1.618.

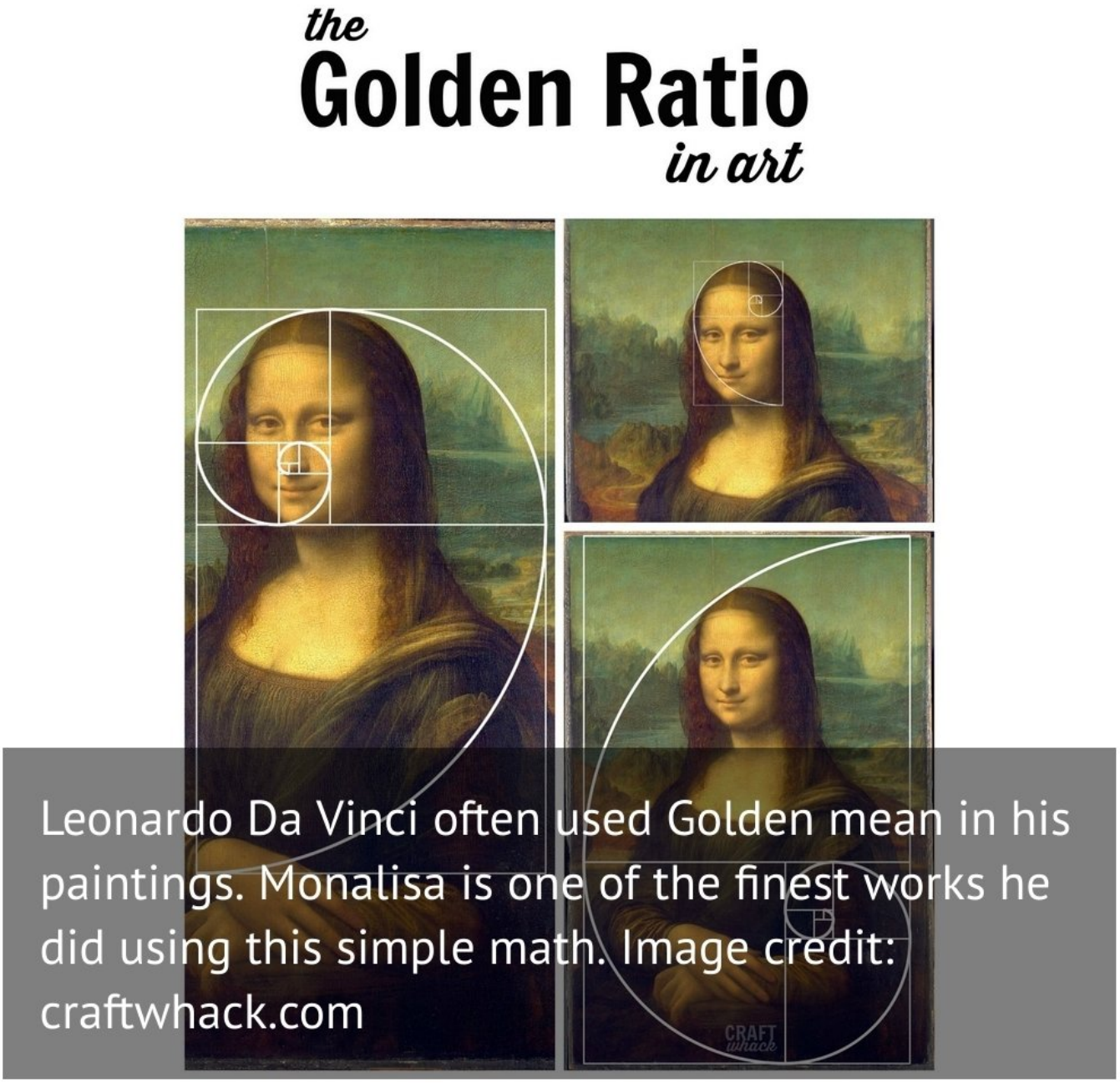


The thing I want to emphasize here is that we always find only those things appealing and attractive that have Phi. It's in our subconscious. Isn't it some revelation? We are the part of this Divine proportion of the God or the Mother Nature. Check these:



Golden Ratio in nature Image source: you-are-another-me.tumblr.com

Modern architects, artists etc. Know about it and that's how they create the modern marvels but even the ancient artists,architects etc. knew about it and that's how they built all those wonders which we still can't stop gushing about.



Now, the question emerges, 'Who discovered this Divine ratio of universal significance on mankind?' We have studied it in our Schools that an Italian scientist named Leonardo Fibonacci gave the concept of this numerical series in 13th century CE. But did he really do it???



The Great Pyramid of Giza is the oldest of the Seven Wonders of the Ancient World. Ancient Egyptians too used Golden proportions to construct huge pyramids. Image credit: thearchinsider.com

The answer most certainly is no. Fibonacci series goes back to more than 2500 yrs ago and it's origin lies in ancient Indian language of Sanskrit.The ancient Indian Rishis &scholars remembered and propagated their knowledge through Sanskrit poetry which made it easy to remember.

2nd century BCE Bharat was ahead of its times in everything.Let it be Science, Mathematics, Astronomy, Astrology , Literature, Philosophy etc, you name it and the ancient Indians knew it. Sanskrit was the most ideal language to share the knowledge right from the Vedic times.

But to make the composition of the Poetry was not that easy a task. To make it easy, beautiful and pleasant to ears something called 'The Sanskrit Prosody' was formed. 'Sanskrit Prosody' or 'the Chhanda Shastra' as the ancient Indians used to call it is a framework of poetry.

पिंगल कृत छन्दःसूत्रम्

वैदिक गणितीय अनुप्रयोगों सहित

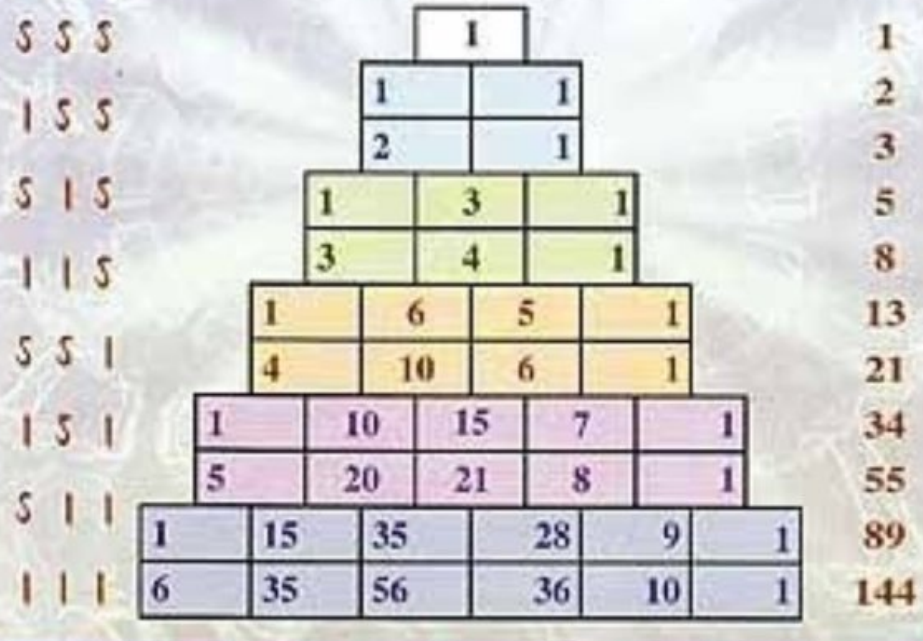
The Prosody of PIṄGALA

A Treatise of Vedic and Sanskrit Metrics with applications of Vedic Mathematics

With Hindi & English Translation

डॉ० कपिलदेव द्विवेदी
डॉ० श्यामलाल सिंह

रूपे शून्यम्

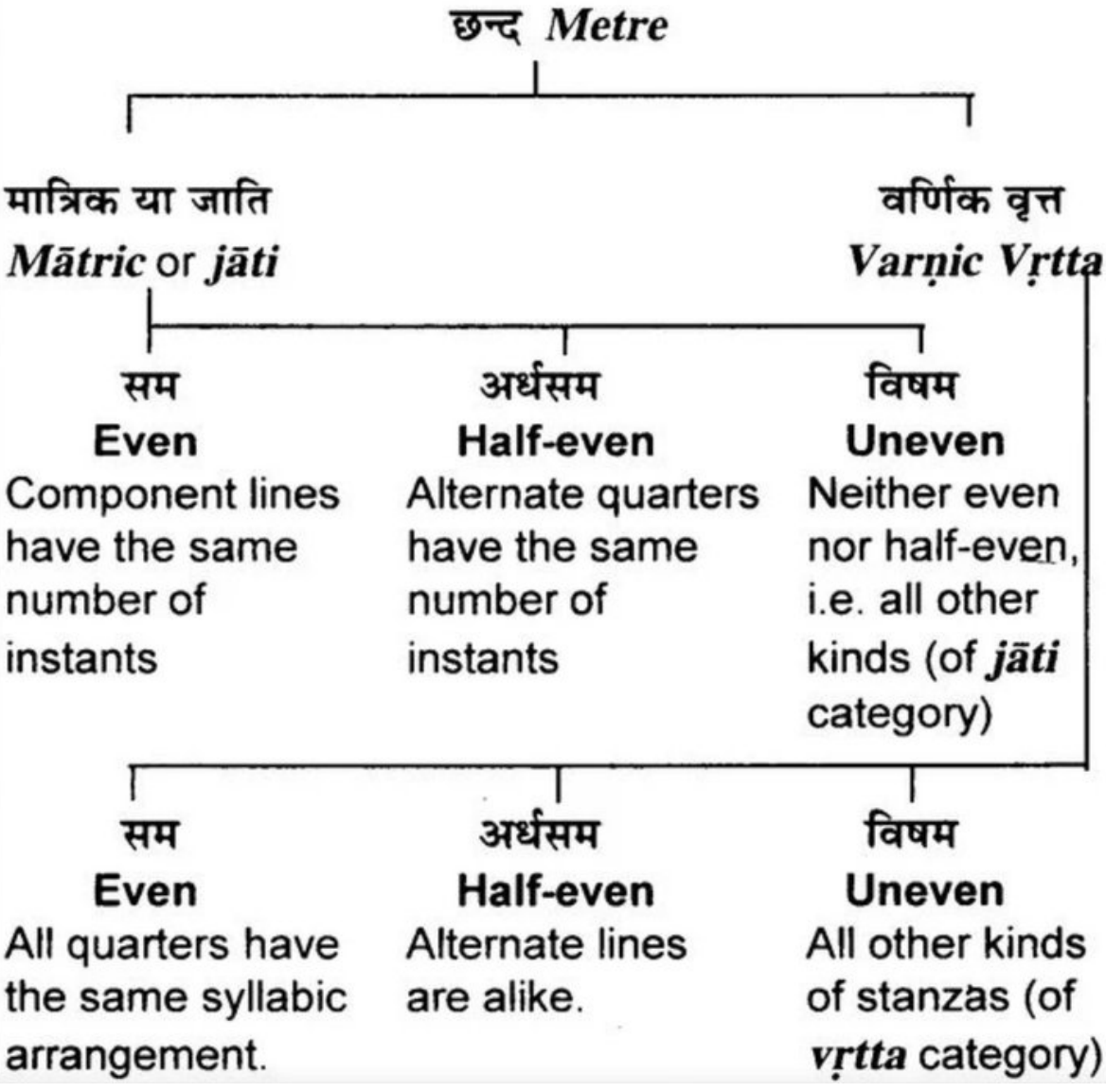


This framework uses natural rhythms and pleasant arrangement of tones to create what we call 'Chhanda' in Sanskrit or 'Verse 'in English &hence the term 'Chhanda Shastra' came into being. And this Shastra has its foundations in the mathematical concept known as Fibonacci Sequence

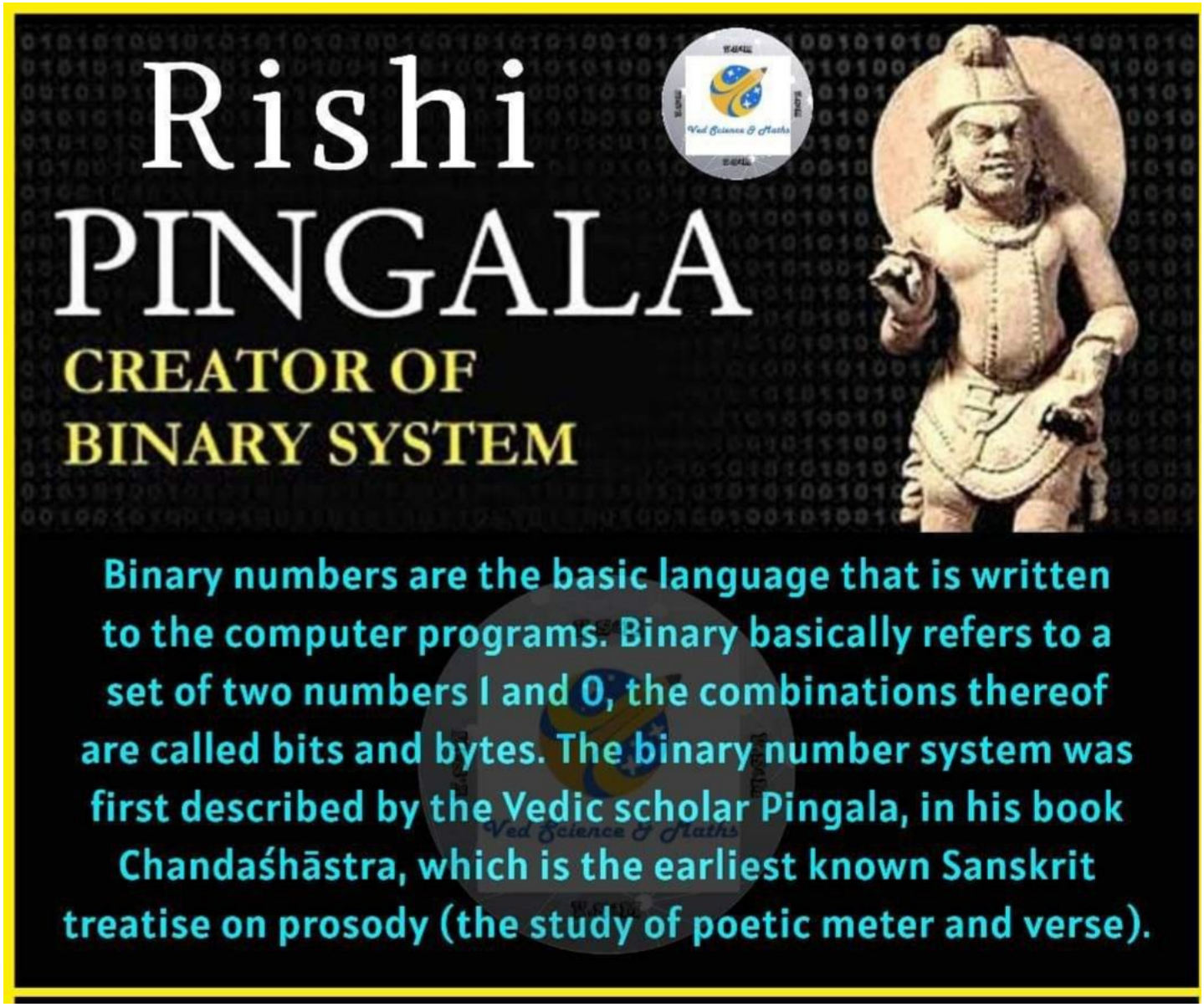
by the number and position of *varṇas* in each quarter. Vedic *gāyatrī* etc. and popular *anuṣṭup, indravajrā*, etc. are the examples of *vṛtta.*

A stanza is of *jāti* (जाति) category, if its each quarter is regulated by the number of syllabic instants (*moras*). They are called *moric* metres or *mātric chandas* (मात्रिक छन्द) or *mātric* metres. *Āryā, mātrā samaka* are the examples of *moric* metres.

The following schematic presentation gives a bird view of *jāti* and *vṛtta* metres with their subdivisions.



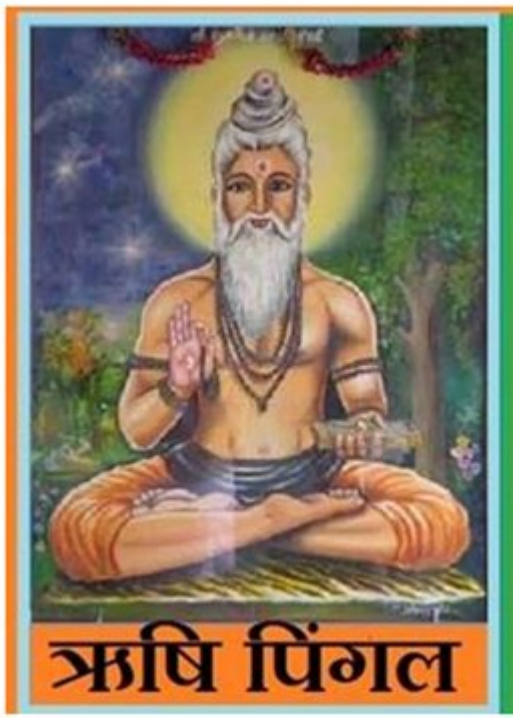
Chhanda Shastra was engineered by an ancient Indian Sage called Pingala. Have you ever heard about him? I m quite sure the answer would be no. Let's get to know him a little.
Rishi Pingala was a 4th century BCE Indian Mathematician and Sanskrit Grammarian.



There are not many specifications available as far as the birth and death of Pingala Rishi is concerned. But what is known about him with evidenced records is that his contributions in the fields of Maths, Science & Literature during the Vedic period were very vast and great.



Many scholars identify him as the younger brother of Panini, a 4th century BCE grammarian and some identify him as the 2nd century BCE scholar called Patanjali. These links are still to be proved but what we know surely with records is that he created 'Chhanda Shastra'.



Pingala's 'Chhanda Shastra' is believed to be the most ancient Sanskrit treatise on prosody. His greatest contributions in the field of Maths include Pascal's Triangle, Binomial Theorem & Fibonacci sequence called as 'Maatra Meru'.

'ChhandaShastra' on 'Sanskrit Prosody' is most exquisite literary masterpiece created by him. Its further extended to the concept of a Pyramid,stacked numbers dat we know by name,'Pascal's Triangle'.But it wasn't the name used by Pingala obviously.He called it 'Meru Prasastara'.

'Meru Prasastara' was a stack of numbers in a Triangle that converged to the Golden Ratio. Halayudha is particularly known for his commentary on Pingala's Meru Prasastara which stands for the staircase to 'Mount Meru' referred to as 'the centre of

Hindu civilization'.

मेरु प्रस्तार (From हलायुध commentary on छन्दशास्त्र, by पिङ्गल)

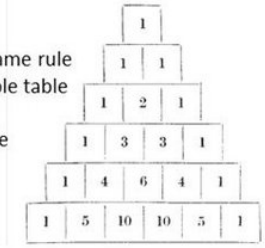
अतोऽनेकद्वित्रिलघुक्रियासिद्ध्यर्थं यावदभिमतं प्रथमप्रस्तारवन् मेरुप्रस्तारं दर्शयति, उपरिष्टादेकं चतुरस्रकोष्ठं(१) लिखित्वा तस्याधस्तादुभयतोऽर्द्धनिष्क्रान्तं कोष्ठकद्वयं लिखेत, तस्याप्यधस्ताच्चयं(२) तस्याप्यधस्ताच्चतुष्टयं यावदाभिमतं स्थानमिति प्रथममेरुप्रस्तारः। तस्य प्रथमे कोष्ठे(३) एकसङ्ख्यां व्यवस्थाप्य लक्षणमिदं प्रवर्त्तयेत्। तत्र परे कोष्ठे यद्वृत्तसङ्ख्याजातं तत् पूर्व्वकोष्ठयोः पूर्णं निवेशयेत। तत्रोभयोः कोष्ठयोरेकैकमङ्कं दद्यात्। ततस्तृतीयायां पङ्क्तौ पर्य्यन्तकोष्ठयोः परकोष्ठगतमेकैकमङ्कं दद्यात्। मध्ये कोष्ठे तु(४) परकोष्ठद्वयाङ्कमेकीकृत्य पूर्णं निवेशयेदिति पूर्णशब्दार्थः। चतुर्थ्यां पङ्क्तावपि पर्य्यन्तकोष्ठयोरेकैकमेव स्थापयेत। मध्यमकोष्ठयोस्तु परकोष्ठद्वयाङ्कमेकीकृत्य पूर्णं त्रिसङ्ख्यारूपं स्थापयेत्। उत्तरत्राप्ययमेव न्यासः।

तत्र(५) द्विकोष्ठायां पङ्क्तौ एकाक्षरस्य विन्यासः। तत्रैकगुर्वेकलघुवृत्तं भवति। तृतीयायां पङ्क्तौ त्र्यक्षरस्य प्रस्तारः। तत्रैकं सर्वगुरु द्वे एकलघुनी एकं सर्वलघ्विति कोष्ठक्रमेण वृत्तानि भवन्ति। चतुर्थ्यां पङ्क्तौ चतुरक्षरस्य प्रस्तारः।

To get every combination of one, two, etc. syllables as required
From first row onwards, the meru tabulation will be shown below.
At the top itself one square cell is drawn
Below this row let us have a pair, half over lapping. Two cells are drawn.
Again the row below will have three
Again its next line will have four
Same way, up to the required stage, cells are constructed
This is called Meru Prastara or Meru-Tabulation

Its first stage-cell will hold the number 1
From here on, the following is the way it grows
In its twin-cell row, the pair of cells holds numbers 1,1
Then in the 3rd row, the extreme cells will hold numbers 1,1
middle cell takes the added value of the two cells above
Thus completes the table for 2nd power
Then in the 4th row also, the extreme cells will hold numbers 1,1
Middle cells take the added values of the two cells above each
This completes the 3rd power

Next and next stages also follow the same rule
Here the twin-cell row gives one syllable table
the 3rd row gives two syllables table
Thus 4th row gives three syllables table
And so on.



There r detailed mentions of Pingala's Chhanda Shastra made by ancient Indian scholars for their respective fields of art.Fibonacci series was used by ancient Indian musicians,poets &architects alike.Astronomer Varamihira used it in his work related to Binomial coefficients.

An excerpt from **"The Venus Blueprint: Uncovering the Ancient Science of Sacred Spaces"** by **Richard Merrick** beautifully illustrates this concept.

Of special significance was the fact Mount Meru had been described as a Fibonacci spiral by the Vedic grammarian Pingala in his *Art of Prosody* (the Chhandah-shastra, 400–200 BC). Pingala claimed that Maatraa-meru actually represents a sacred mathematical cadence that converges toward the golden mean—the same constant found in the intersections of the Star of Venus.

Mountain of Cadence

In Pingala's account, Mount Meru was a pyramid of stacked numbers from which diagonals could be added to produce the numerical series {1, 1, 2, 3, 5, 8, 13, 21, ...} (Fig. 8). Known today as Pascal's triangle, the sequence of numbers within this pyramid is the Fibonacci series generated by the equation f(n) = f(n-1) + f(n-2). Long recognized as an organizing property in nature, Fibonacci proportions are found in the distribution of limbs on a tree, spiral geometries in sea creatures, and branching proportions of the human body, to name just a few.

As Pingala explained it, this series creates a "mountain of cadence" in how the diagonals of the pyramid ascend to Unity or one at the top of the pyramid, while also spiraling downward as adjacent arithmetic proportions that converge toward the golden mean of about 1.618033.[14]

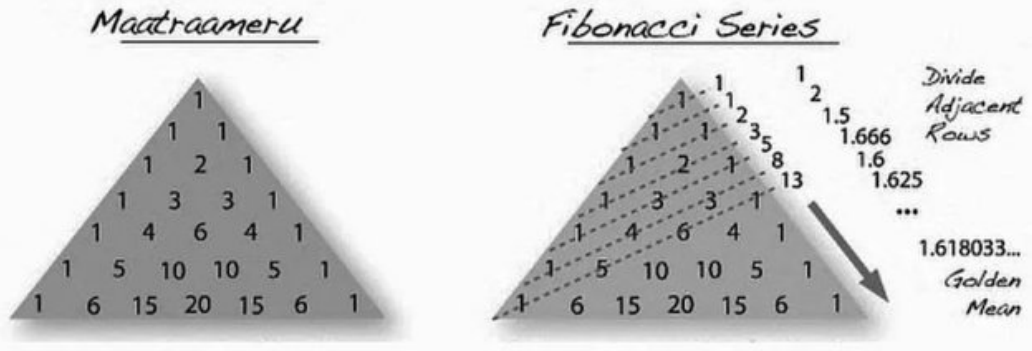


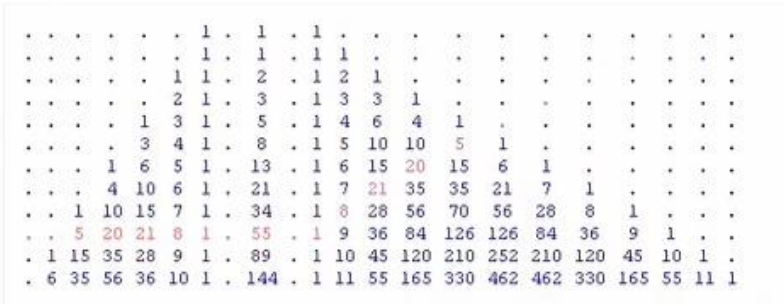
FIGURE 8. *Mount Meru as a Fibonacci cadence*

Acharaya Hemraj strengthened Rishi Pingala's legacy 1000 yrs ago.
The legitimate question is how come the 'Meru Prasastara' of Pingala became world famous as 'Pascal's Triangle' and how come 'Maatra Meru' of Pingala came to be known as 'Fibonacci Series' worldwide.

Fibbonacci or मात्रामेरु?

आचार्य पिङ्गल's contribution to mathematics

- Binary numeral system
- Mātrāmeru series



Before Fibonacci wrote his work, the sequence F_n had already been discussed by Indian scholars, who had long been interested in rhythmic patterns that are formed from one-beat and two-beat notes or syllables. The number of such rhythms having n beats altogether is F_{n+1}; therefore both Gopāla (before 1135) and Hemachandra (c. 1150) mentioned the numbers 1, 2, 3, 5, 8, 13, 21, ... explicitly. [See P. Singh, *Historia Math.* **12** (1985), 229–244; see also exercise 4.5.3–32.]

- Donalad Knuth,
The Art Of Computer Programming, Volume 1, 3/E

And this happened not only with Pingala, it has happened with many other ancient Indian Rishis also who have been discredited of the major works they did in the fields of Maths,Science etc.Did this happen bcoz of the raids &ultimately conquest of Bharatvarsh by the western powers

I think so. These forces came to our Motherland, termed us uncivilized, looted our wealth, stole our scriptures, took it back, copied everything and propagated it as theirs. That's what happened. But it must be corrected now. What belongs to us must be returned to us.

What all we have been discredited for, must be accredited to us. It's a universal truth that Bharatvarsh is the source of civilization and all knowledge of the world and it is being proved slowly but steadily.

It's also time for the Indian education system to teach its youth the true history of Bharatvarsh and make them feel proud of their country's lost heritage and ancestral wisdom.

Jai Bharatvarsh ■
Jaitu Sanatan ■

PASCAL's TRIANGLE

NAMED AFTER FRENCH MATHEMATICIAN BLAISE PASCAL

(1600)

1

1 1

1 2 1

1 3 3 1

1 4 6 4 1

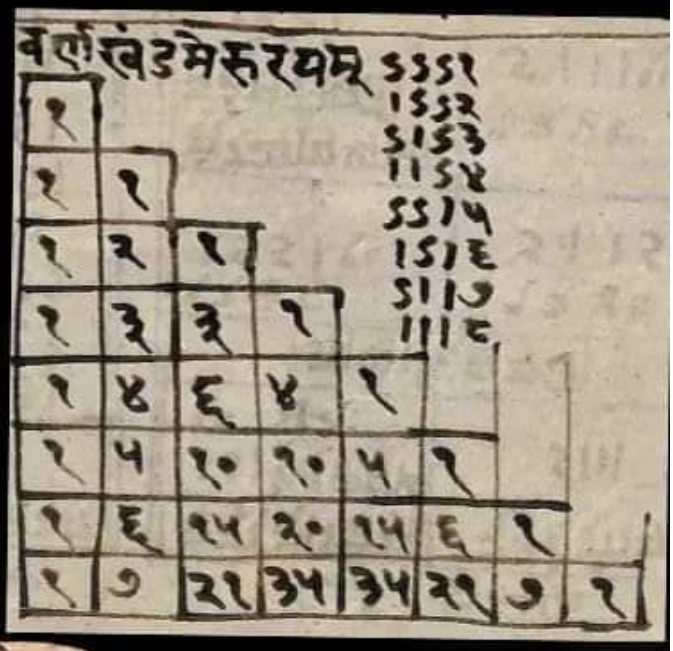
1 5 10 10 5 1

1 6 15 20 15 6 1

MERU PRASTARA

DERIVED FROM PINGALA'S FORMULA

(300 BCE)





Pingala,
Indian mathematician
3rd century BCE

THE DAILY SWITCH

INDIA'S CONTRIBUTIONS TO MATHEMATICS NEED TO BE RECOGNIZED!