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Ancient Vedic Science : Foundation of Modern-Day Science

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Abstract : Indian technology and science that was neglected by Indians themselves has again found its way back in people's minds. Not only Indians but also the whole world accepts it. India - The land of Vedas, these remarkable Vedas contain not only religious ideas for a perfect life, but also facts which science has proved true. Electricity, radium, electronics, airship, all were known to the seers who founded the Vedas. Indians, who taught us how to count, without which no worthwhile scientific discovery could have been made. Ancient science mentioned in all four Vedas in a detailed manner can be considered as the foundation of modern science that now has been acknowledged and considered worldwide. In this research paper, we are going to talk about discoveries, inventions and research done by the Indian sages documented in these Vedas dating back to 1500 B.C.E, around 3000 years ago and how they form the foundation of modern-day science.

Index Terms **- Vedas, discoveries, science, medicine, engineering, and Indian literature.**

INTRODUCTION

Veda literary means knowledge. Vedas for quite some time were considered speculations of itself. But these theories of scholars were proved wrong through the new insights into varied knowledge of different topics and subjects. Vedic knowledge includes archaeology, astronomy, and all kinds of sciences. Vedas are now being accepted in present-day India and the world because of their deep information in physics, mathematics, logic, medicine, and other disciplines. [2]

The foundation of modern-day science are based not only on Vedas but also their appendices or the epilogues called the Vedangas. The six Vedangas deal with:

1. Kalpa: Rituals based on geometry; Vedic Mathematics; Calendars and Dates
2. Shiksha: Phonetics (the study of the sounds of human speech)
3. Chhandas: Metrical Structures
4. Nirukta: Etymology
5. Vyakarana: Grammar
6. Jyotisha: Astronomy; Cyclical phenomena [2]

According to Vedas, our body is made up of the five elements i.e. Ether (Sky), Air, Fire, Water and Earth. These elements are inter-related to the celestial Gods. The figure given below depicts this information. Each element is associated to the five senses of the human body: smell taste touch sound and form which further relates to the human psychological needs like emotions intellect mind and body. [2] So the Vedas clearly define which elements influence which of the human senses and how they affect them psychologically. This has now been proved through the research done by various researchers. [13]

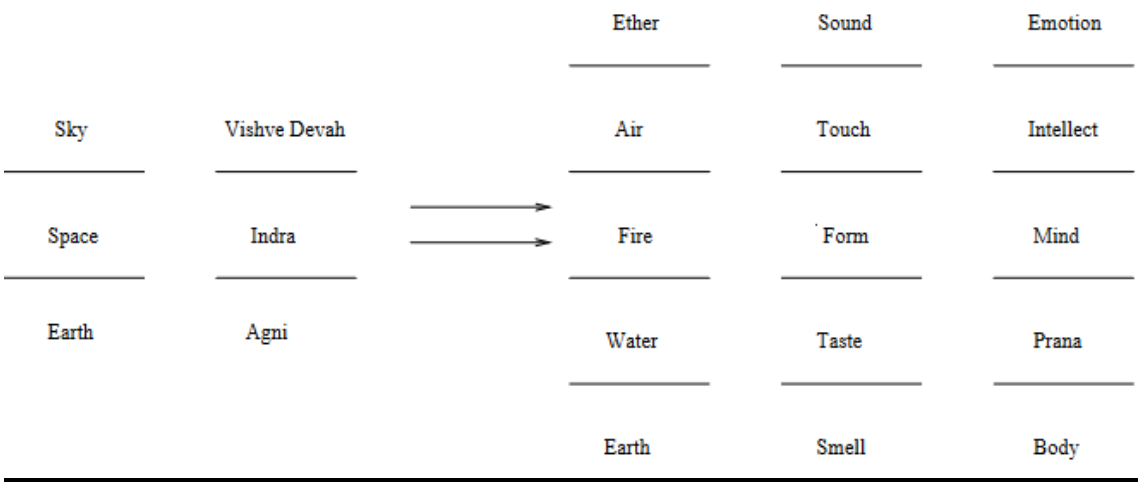

Figure1: From the tripartite model to five categories of analysis

Chronology

If we put Vedic science in perspective it is essential to have an appropriate insight of the Timeline of Vedic Works. There are planetary references in the Vedas which recall the events of the 3rd or 4th period BC and before. Recently discovered(e.g. Feuerstein 1995) that the Saraswati, the major waterway of the Rigvedic period, had dried up around 1900 B.C. due to tectonic upheavals, the time of Rigveda must be earlier for this era, probably before 2000 B.C. since the literature that directly arose after Rigveda does not talk about any geological disaster. [2]

Traditional accounts exist in the Puranas that specify more artifact of the Rigveda: For example, the Kaliyuga tradition talks about 3100 B.C. And the Varahamihira tradition mentions 2400 B.C. According to Henri-Paul Frankfurt (1992) of the Indo-French team surveyed the region, the Saraswati river was no longer a perennial river by the 3rd millennium B.C.; it supports those who argue for the old dates. But in the absence of conclusive evidence, it is prudent to take the most conservative of these dates, i.e. 2000 B.C. as the newest dated time to be correlated with the Rigveda. [11]

Bhagavad-Gita and The Way Of Life

Like the Vedas, Puranas and Mahapuranas show us the scientific and logical way to lead a happy and healthy life. On one hand Vedas tell us the theoretical science while on the other hand puranas and Mahapuranas give us real life examples of ideal humans. [6]

A major segment of the Mahapurana, Mahabharata is a conversation between Lord Krishna and Arjuna in the Kurukshetra where he plays the role as his mentor and guides him about the way of life. The guidelines given by Sri Krishna to Arjuna were documented in the form of 18 chapters that we now know as Bhagavad-Gita. Though documented near 2000 B.C., its learning are still applicable in the present-day scenario. [6] Some of its learning are:-

- Why worry? Be happy. Learn to take life as it comes. Learn to overcome it. Forget what you're agonizing over. A job interview that didn't go as planned or the relationship you were hoping for, but it didn't work out. You need to take things in stride. Let go and believe that everything happens for a reason. You cannot regulate the past, nor can you manipulate the future. You only have the present so learn to live it to the maximum.

- 'Work, don't worry about the result.'- Today people are working for a big house, a fancy car and the list is endless. We do everything with the 'end result' in mind. We suffer when the 'end result' is not as per our expectation. Keep it simple. We only have work in our hands.

- There is only one thing constant in life and that is "CHANGE" – you can become rich and famous today. Tomorrow both fame and fortune may be gone. Accept both the situations equally. Weather changes, people change, night follows day, etc. Learn the lesson of change from Mother Nature. Change in life makes you resilient and shows you how to persevere.

1. The body is mortal, and the soul is eternal – the soul does not die. The fear and anxiety of death kills ambition and cuts the odds of progress. Be valiant, fearless, the body dies not the soul. You should try to remove terror from your mind. Fear is a hindrance to your happiness.

2. We came into this world unaided bare handed and will leave this world bare handed unaccompanied. -Your phone won't even go with you! Attachment to material things is pointless. Nowadays we do not own things, but things have started to 'own our lives'.

3. Work, eating, sleeping, or craving, etc. too much or too little, is not going to bring you closer to the higher reality. Be moderate in your approach, eat and sleep well and make time for recreational activities too!

4. Anger makes you lose your balanced approach. It is not possible to reason with such a state of mind. In such a state you cannot reason judiciously and thus your destruction is certain. Anger element is the root cause of failures in a person's life.

5. Greedy and selfish attitude is like a dusty mirror. A greedy person will fail to understand the truth while dealing with any situation. One-sided vision will keep him bound by doubts and disappointments. Contentment is what you have that is essential. Be happy and satisfied first and then work for your needs.

6. Nothing is achieved by a doubting mind - Doubting the 'Absolute Truth' or a greater force at work is the main reason many people lead unhappy lives. According to the Bhagavad Gita, a skeptical mind will be at peace neither in this world nor in the next. have faith. Trust brings positive energy and flow.

7. Mind Matters - Your thoughts can either make you or break you. If you can think about it, you can get it. When your mind is in a positive frame before any exam or presentation, chances are better that you will do better. [8]

Mathematics and Geometry

The Hindu monk Swami Bharti Krishna Tirtha known as the father of Vedic Mathematics, was the one who had rediscovered 16 *Gannit Sutras* i.e. the mathematical formulae. These formulae were found out from the Yajurveda.

Mathematics has been an eternal part of 3 out of 4 Vedas i.e. Rigveda, Yajurveda, Atharved. It is mentioned in *Shatapatha Brahmana* (meaning analysis of sacred knowledge). It is known as *apar vidya* in the Vedas. [12]

In the following verse of Rigveda the concept of circumference of circle is mentioned:-

कासीत्प्रमा प्रतिमा किम निदानम
आज्यं किमासीत परिधि: का आसित
चंद: किमासीत प्रागं किमुक्तम
यद्देवा देवमयजंता विश्वे

The above given verse has terms of geometry that justify the present-day formula of circumference=$2\pi r$

The perimeter and area of the geometric shape triangle is stated in Atharvaveda:-

यो अक्रण्डयात सलिलम महित्वा
योयम कृत्वा त्रिभुजम स्यानः
वत्स: कामदुघो विराज:
स गुहा चक्रे तनव: परचै:

Here we talk about the house of God that is threefold and its sides are the Heaven, the Sky, and the Earth. [4,12,13]

Architecture:

The science and technique behind the architectural structures of ancient India were completely based on the direction of sun and the sun rays at different timings. This science or architecture known as the Vaastu Shastra has been the part of Vedas for many years. Vaastu Shastra has it origins in the *Stapatya Veda* which is a part of **Atharvaveda.** [14]

Vaastu Shastra was always considered as a technical subject and only the Sthapatis (Architects) and their heirs had access to it. It consists of details about construction techniques, architectural principles and sculpture design which has been incorporated in the Temple Architecture. [14]

Temples: Time and Structure

There was no division between the sacred and the secular in the ancient world. Temple served as the place where punctual rituals were performed and keeping time was one of its basic functions. The temple was built on the east west axis, with the inner sanctum facing east in such a way that the first ray of the rising sun fell on the deity's face, symbolic representation of the Sun God paying regards to the Almighty and taking blessings to awaken the world to a healthy new day. [5] The details of the Temple Structure are as follows:

Temple Structure

The temple architecture of ancient India was very vast but still, there were some common points that we can still see in the present-day. Each Temple was divided into 7 foremost segments. On the horizontal plane (x-axis) the temple is made as if the deity is lying down. [10,12]

1. **Gopuram** is the entrance of the temple and is the feet of God.
2. **Dwajastambham** is where flag is hoisted that represents bravery and power of God and is present between the kundalis-Muladhara and Swadhisthana.
3. **Bali Peetham** literally means the Sacrifice Pedestal where a human sacrifices its instinctive behaviour of Matsarya(envy), Madha(pride), Moha(delusion), Kama(lust), Krodha(anger) and Lobha(selfishness) before entering the main temple. Present above the kundali-Swadhisthana.
4. **Adhikara Nandi** is the human form of Lord Shiva's bull-Nandikeshwara who is the chief of Ganas of Lord Shiva and has the Adhikara (authority in Sanskrit) over the Ganas. Present between the kundalis-Swadhisthana and Manipura.
5. **Maha Mandapam** is the largest area of the temple made for gathering people during religious discourses. Present between the kundalis- Manipura and Visuddha and just above Anahata.

6. **Vimana** represents the sacred mountains that facilitate the spiritual journey of a human. Present just above the kundali-Ajna.
7. **Garbhagriha** is the location of the idol of the main deity of the temple. It is the location of God's mind and spirituality. It is constructed in such a way that the rays of Sun after entering the temple first trace the deity's idol. This is the place on the Ajna kundali and within Vimana, where a human attains spirituality.

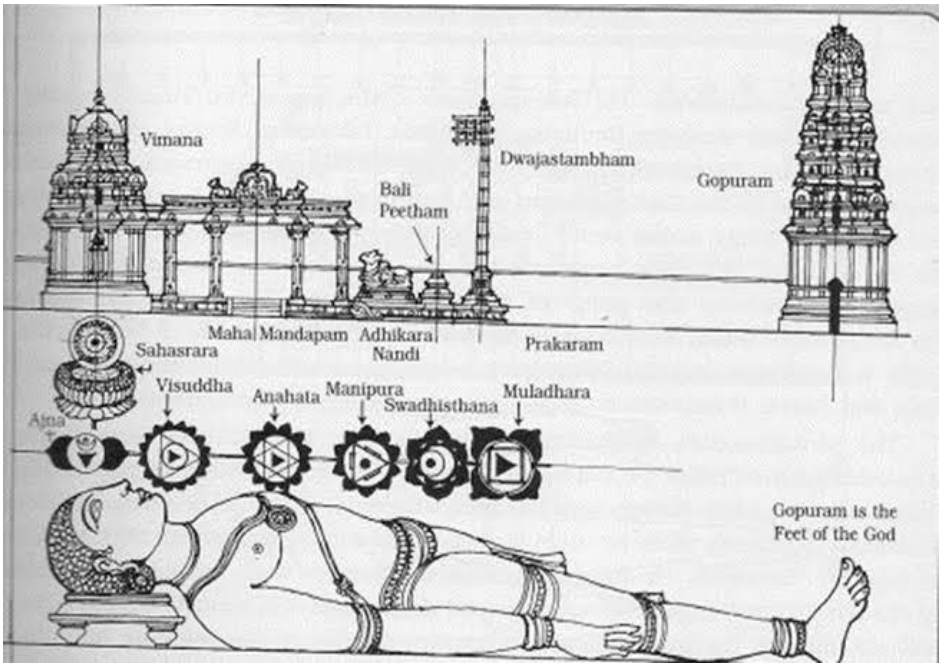

Figure 2- Details of a temple structure as per the lying Deity

Time

As per the Vedas Puranas and Mahapuranas Time plays a significant role in the life of human beings. To have a healthy prosperous and happy life it is extremely important to understand the value of time which has been diligently explained in the Vedas and can be seen in the carvings done in the Temples of India, these carvings explain in detail not only how to tell the exact time using shadows and trigonometry but also explain in detail what activities to be performed during which hour for a healthy and happy life. The lifestyle which is being propagated now-a-days had its roots way back 3000 years ago in the Vedas which is absolutely evident in the present scenario.

Figure 3- Konark temple, Orissa *Figure4- Ghatika Yantra(water clock)*

Konark temple- The sundial has 8 shafts which divide 24 hours into 8 equal parts, which means the time between two shafts is 3 periods. Also there are 8 small matchsticks. Each mini match takes place right in the middle of 2 big pairs.

Ghatika Yantra- Time in a water clock is measured using the outflowed water. Using the science of ancient India, water clocks were used to measure time. The number of hours is measured through water overflowed.

A ritual is fulfilled through three altars. These altars are the circle(*vritt*), semi-moon(*ardhachandra*) and square(*varg*). These altars represent the earth, the atmosphere, and the sky, respectively. The diagram below represents the following structure of ritual.

Circle	→	Earth	→	Body
Semi-moon	→	Atmosphere	→	Prana(soul)
Square	→	Sky	→	Consciousness

With the temple viewed as a map of the universe, the main altar corresponds to the sun and the door at the west corresponds to the earth. The origin in India of the measure of 108 as the distance in sun-diameters from the earth to the sun may be the discovery that a pole of a certain height removed to a distance of 108 times its height has the same angular size as the sun or the moon. It led to a

conceptual framework for the sun-earth-moon system that became a part of Indian cosmology. It was further assumed that beyond our system existed other worlds. [5]
Because of the supposed recurrence, the number characterizing the universe must also be 108. Associated with the activities of gods and humans. not surprisingly this number appears as the number of beads in the Indian rosary (to tell the beads is to make a symbolic journey around the world), a number of dance movements of Natya Shastra, names of Gods and Goddesses, number of pilgrimages, number spiritual master, and so on. There are 108 divisions of the zodiac and also there are 108 rhythmic pattern (taala) of music. with the human body described by a measure of 108, the weak points of the body are numbered 107 in the Ayurveda system. Similarly, each of the 27 constellations of the zodiac is divided into 27 sub-Nakshatra (ŚB 10.5.4.5). Time measures are defined in a sequence of multiples 30. [5]
It is clearly evident that ancient Vedas have a detailed description of construction techniques using mathematical formulas as well as scientific application of the sun rays weather conditions, location, geographical details, concept of direction and relation between the function and the form in which it has to be performed.

Ancient Time and Medical Science

The Rigveda, the oldest manuscript of archaic Indian culture, states that the Ashwini Kumaras, identified as Dev Vaidya (Doctor of the Gods) was a prominent surgeon of the Vedic period who had performed rare legendary surgical operations. The Rigveda says that Ashwini Kumaras performed the first plastic surgery to reattach the head of Sage Chyawan with elephant trunk when Daksha cut off his head. His other classic works include operation of an Eye, Rijasva, implanting the teeth of Fushna in his toothless mouth, a head transplant of Ganesha, whose head was cut off by Lord Shiva in anger of disobedience, with the head of an infant elephant, reattaching the head of Lord Brahma and Saint Dadhichi (Son of sage Atharvan, Author of Atharvaveda), whose head were axed off by the devil Bhairava, and relocate with the head of a horse on Dadhyancha's body preserved through Madhu Vidya (honey technique). [3]

Figure 5- Nose Job done in 6th Century B.C

However, a realistic and systematic early collection of the medical science of ancient India compiled by Charaka is known as Charakasamhita. It describes the functions of ancient medical practitioners, like Acharya Athreya and Acharya Agnivesha of 800 BCE, and includes principles of Ayurveda remained a standard textbook of Ayurveda for nearly 2,000 years. They were followed by Acharya Sushruta around 600 BCE, who was an expert in cosmetic, plastic, and dental surgery called Sandhana Work. He has treated many cases of ***Nasa Sandhan*** (rhinoplasty), ***Oshtha Sandhan*** (cheiloplasty), and ***Karna Sandhan*** (otoplasty). And hence, he is known as the Father of Ancient Science and Plastic Surgery. These Surgical procedures are mentioned in detail in the Atharvaveda. [3,9]

Conclusion

The Vedas address all aspects of existence through karma and dharma, the natural laws that sustain the universe, which reflect not only matter and energy but life, mind, and consciousness. Thus, the Vedas constitute much more of what can be called as science in the modern sense of the word. Indians invented zero and the number system, one of the greatest inventions in history. The decimal system, the value of pi, calculus, trigonometry, basic concepts of algebra and many mathematical concepts all originated in India. According to historians, the Indus Valley Civilization has revealed evidence of the practice of surgery and dentistry as far back as

7000 BCE. An excavated site at Mehrgarh even showed evidence of healers' healing nose and stitched abdomen along with surgical instruments. Ayurveda, apparently, came from the Indian subcontinent, being tracked as far back as 5000 BCE. Medicine generally comprises of intricate herbal compounds, elements, and metal substances. It is only the legacy of India that has paved the way for the present progress in science and technology. Traditional science formulates principles and theories that describe nature, while indigenous knowledge systems develop values, beliefs, customs, rituals based on an understanding of nature and the universe.
Hence, we can safely say that Ancient Indian Science is the foundation of Present-Day Science and Technology.

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