

# The Contribution of Ancient India To Modern Science

Dr. Surabhi Singhal

Assistant Professor (Physics), Government Girls Degree College, Kharkhauda, Meerut.

**Abstract :** Indian civilization is one of the oldest civilizations in the world and has a strong tradition of science and technology. Our culture has a long history of producing brilliant minds, from ancient seers and philosophers to modern scientists. Research shows that India made important contributions to science and technology hundreds of years before modern laboratories were built. Numerous ideas and methods developed by ancient Indians have helped build and strengthen the foundations of modern science and technology.

**Keywords:** Ancient India, Cloning, Metallurgy, Laws of motion.

“Many of the advances in the sciences that we consider today to have been made in Europe were made in India centuries ago.”

James Grant Duff (British Historian)

## INTRODUCTION

From the bronze dancer sculpture and advanced urbanisation of the Indus Valley Civilization to the investigation of the moon's surface, science has come a long way in India. As we all know today India is not only famous for its IT sector but also for its prestigious organizations in science as ISRO and DRDO. Homi J Bhabha, dubbed the "Father of Indian Nuclear Physics," shaped India's scientific future. Dr. J. C. Bose pioneered plant physiology, Dr. Abdul Kalam made contributions to defence technology. Also in terms of Science and technology, ancient India was likewise well ahead of its time. Science was highly developed during the ancient period in India. Whatever we see now, from missiles to hydrogen bombs, cars to jet planes, and so on, was largely recorded in Sanskrit in the form of Shloka in Vedas, Vishnu Purana, Ramayana, Mahabharata, Srimad Bhagavata Gita, and so many more volumes. After launching the missile, it could be recovered, its target changed, and it could hit one or more targets at the same time without missing the target (known as Brahmasutra in ancient time).

## SCIENCE AND SCIENTIST IN ANCIENT INDIA

### MEDICAL SCIENCE IN ANCIENT INDIA

#### Sushruta

Sage Sushruta is known as the “Father of Surgery”. India was the first place where rhinoplasty (developed by Sushrut) was invented and used, and even modern science agrees with this. He also cut off limbs, delivered babies, and operated on the head. He made 125 surgical tools, such as scalpels, lancets, and needles. He was the first person to do an autopsy. He learned about how people are put together by looking at a dead body. In *Susruta Samhita (Book written by Sushruta)*, over 1100 diseases are mentioned including fevers of twenty-six kinds, jaundice of eight kinds and urinary complaints of twenty kinds. The method of preserving a dead body for the purpose of its detailed study has also been described in this book. The text also mentions various illnesses, and their cures along with complex techniques of plastic surgery. Shusruta was the first who performed cataract surgery.

#### Charak

Charak is known as “Father of Ayurveda”. He appears to have been a pioneer in the "prevention is better than cure" philosophy. He states “A physician who does not enter a patient’s body with the lamp of knowledge and understanding will ever be able to treat diseases. He should first investigate all of the factors that influence a patient's sickness, including the surroundings, before prescribing medication”. *Charak Samhita* a remarkable book on medicine has the description of a large number of diseases, their causes as well as the method of their treatment.

#### Cloning In Ancient India

The Concise Columbia Encyclopaedia says that clone is “a group of organism descended from a single individual through asexual reproduction”. There are numerous citations that show that ancient people were aware of the process of cloning. It is said that Kusha, Sita's son, is a clone of Lava in the Ramayana, the epic of the Hindu religion. It was Valmiki who fashioned him out of some withered grass (kusha in Sanskrit). In Mahabharata also according to the description the Kauravas were created by dividing a single embryo into 100 parts and growing each part in its own kund or container. Ancient Indians not only knew about test tube babies/cloning and embryo splitting, but they also had the technology to grow human foetuses outside of a woman's body—something that modern science does not know.

### MATHEMATICS IN ANCIENT INDIA

Indian mathematicians not only introduced the concept of zero to the world, but also made significant advancements in the fields of trigonometry, algebra, arithmetic, and the study of negative numbers. India is credited with being the birthplace of the decimal system, which is used all over the world today. This is possibly the most significant fact.

#### The Number Zero

Nothingness itself offers no novel insights. However, one of the most important developments in mathematics is when nothing becomes a number in its own right; this is zero. It's not surprising that India was the place where the number zero was first used, sometime in the third or fourth century. The ancient Indian text, the Bakhshali manuscript, which has been in British hands since 1902, has been identified by scientists as the source of this conceptual leap.

#### The Binary Numerical System

Binary numbers are a set of two numbers 1 and 0, that are used as a language to write computer programmes. Pingala wrote about bits in "Chandahstra," which is a book about prosody. People say that Pingala used short and long syllables to represent binary numbers, which is a way of writing that is similar to Morse code.

### Value of Pi and Negative Numbers

The value of  $\pi$  was first calculated by Indian mathematician Baudhayan which is useful in calculating the area and circumference of a circle. Also the theorem which is known as Pythagoras theorem today can be found in Baudhayan's *Sulva Sutra*, which was published several years before the age of Pythagoras.

Brahmagupta pioneered the use of negative integers and operation of zero as a number in mathematics. He worked a lot with geometry and trigonometry and found new theorems. He also showed how to find cubes, cube roots, squares, and square roots. He wrote 'Brahm Sputa Siddantika,' which introduced the Arabs to our mathematical theory.

### CHEMISTRY IN ANCIENT INDIA

Ayurveda, which utilised a variety of minerals in ancient India, played a vital influence in the development of chemistry. In ancient and mediaeval India, science and technology encompassed all major areas of human knowledge and activity. In any early culture, metallurgy has remained a central activity to all subsequent civilizations, from the Bronze Age to the Iron Age. India has proficiency in metallurgy since ancient times. The level of expertise that India possessed in the field of metallurgy was of the highest order.

### Indus Valley Civilization

The Indus Valley Civilization, or Harappan Culture, was India's first urban civilization and one of the world's first civilizations. Archaeologists discovered a well-developed urban structure with public baths, roadways, granaries, temples, baked brick dwellings, mass production of pottery, and even their own script depicting the story of early chemistry. Residents of the Indus Valley had access to gold and copper mining, and the area was possibly a source of semiprecious stones. This is seen in the jewellery recovered in the vicinity.

### The Vedic Age

A large number of assertions and materials contained in ancient Vedic literature have been demonstrated to correlate with modern scientific results, and these literatures have also revealed a highly developed scientific content. The chemical activities of this period are illuminated by the Puranas, and Upanishads. Various cement preparations and types that were used on temples and other structures were also listed. The Indian alchemists were skilled at casting metals, extracting metals from their ores, and smelting metals. The Ramayan and the Mahabharata mention weapons with arrowheads coated with a variety of chemicals, indicating their knowledge of Alchemy.

On top of that, a pillar made of iron that was erected in the 4th century and is still standing in Mehrauli, Delhi, shows no signs of rust despite being exposed to the elements for over 1700 years. Here is some of India's fierce ironwork. The 90-ton iron pillar from the Konark temple, constructed in the 13th century, shows no signs of corrosion.

In the sixth century BC, the sage Kanad demonstrated that every substance in the world is composed of smaller building blocks called atoms. The atomic theory proposed by Kanad was the very first atomic theory ever proposed.

### PHYSICS IN ANCIENT INDIA

Physics, which is part of the natural sciences, was first developed in ancient India. Here is some contribution of ancient India in the field of Physics:

#### Universe

Our Srimad Bhagavad Gita has a description of the elements that make up the universe. While bestowing Srimad Bhagavata Gita to Arjuna, Lord Krishna demonstrated the solar system (Viswarupa) to him and spoke of the existence of a universe containing countless galaxies. Each galaxy contains innumerable stars. For this, Lord Krishna bestowed Dviya Drishti (super eyes) and power on Arjuna because his material body was incapable of seeing, hearing, or feeling Lord Krishna's teachings. It is the path of one type of subatomic particle. This is due to the fact that they are attempting to observe something on the same scale, which was later scientifically explained by Werner Heisenberg when he developed his famous uncertainty principle in the 1920s, which states that when a physicist attempts to observe a subatomic particle, the experimental apparatus inevitably alters the trajectory of the subatomic particle. We Indians worshipped the nine planets (navgreh) in our solar system before anyone else knew about them.

#### Distance between the Sun and the Earth Mentioned in Hanuman Chalisa

Tulsidas, a poet-saint who was also a philosopher and reformer, wrote the Hanuman Chalisa in the 15th century. One line "Yug Sahastra Yojan Par Bhanu" of "Hanuman Chalisa" makes it easy to figure out how far away the Sun is from the Earth.

This means that Sun (भानु) is at a distance of Juug Sahastra Yojans (जुग सहस्र योजन- Distance Unit in Hindi) . According to Hindu Vedic Literature-

1 जुग = 12000 years,                      1 सहस्र = 1000,                      1 योजन = 8 Miles

Thus distance between the Sun and the earth =  $12000 \times 1000 \times 8 = 96,000,000$  miles  
= 153,600,000 Kms (1 mile = 1.6 kms)

This is much closer to the calculations of the modern scientists.

#### Newton versus Rishi Kanad (Laws of Motion)

Newton's laws of motion are a set of three physical laws that, when taken as a whole, served as the cornerstone for the development of classical mechanics. They explain the relationship that exists between a body and the forces that are acting upon it, as well as the motion that the body exhibits as a direct result of those forces.

Now we discuss Rishi Kanada's Sutras also called Vaisheshika Sutra written in Sanskrit text authored by Rishi Kanada in ancient India.

**First Sutra** - वेगः निमित्तविशेषात् कर्मणो जायते [ Vegah Nimitta Visheshat Karmano Jayate].

**Translation:** Change of motion is due to impressed force. (The law states that an object at rest tends to stay at rest and an object in motion tends to stay in motion with the same speed and in the same direction unless acted upon by an unbalanced force.)

**Second Sutra** - वेगः निमित्तापेक्षात कर्मणो जायते नियतदिक क्रियाप्रबन्धहेतु । [Vegah Nimitta Pekshat Karmano Jayate Niyatdik Kriya Prabandha Hetu].

**Translation:** Change of motion is proportional to the impressed force and is in the direction of the force.

**Third Sutra** - वेगः संयोगविशेषविरोधी। [Vegah Sanyog Vishesh Virodhi.]

**Translation:** Action and reaction are equal and opposite.

As a result, we are able to assert that ancient books from India were the primary inspiration for a great deal of innovation and discovery all over the world.

### Conclusion

Many people are under the impression that India has always been the home of sages and peers who have been the sole authors of mythological writings and those who have devoted their lives to their study. To the contrary, the ancient Indian civilization has a history of science and technology that is both extremely robust and comprehensive. This tradition dates back to the earliest times in human history. Thus we can say India was not only independent in terms of its economy and technological capabilities, but it also served as a Vishwaguru, or global leader.

### References

1. Ancient science.pdf, module VI, scientist of ancient India Ch-15.
2. Chavvi Purwar, Significant contribution of chemistry in ancient Indian science and technology, International Journal of Development Research Vol. 06, Issue, 12, pp.10784-10788.
3. AK Mandal, Physics in Ancient India: An Introspective Study, American Journal of Engineering Reasearch Vol.9, Issue 9, Pg 1-6.
4. AK Mandal, Origin of laws of motion (Newton's Law): An Introspective Study, American Journal of Engineering Reasearch Vol.9, Issue 7, Pg 87-92.
5. [https://www.researchgate.net/publication/339850335\\_Human\\_Cloning\\_in\\_ancient\\_India\\_Is\\_it\\_a\\_reality](https://www.researchgate.net/publication/339850335_Human_Cloning_in_ancient_India_Is_it_a_reality)
6. <https://www.amarujala.com/spirituality/religion/hanuman-chalisa-facts-distance-between-earth-and-sun>
7. <https://subhashkak.medium.com/ka%E1%B9%87%C4%81da-the-great-physicist-and-sage-of-antiquity-5a2abd79b6f1>
8. <https://pparihar.com/2017/05/22/modern-inventions-stolen-from-the-vedas/>
9. <https://Vaishesika> Sutras by Kanada describe Laws of Motion.