



Vidyadayini



Samhita Cultural Association of Arizona
2018



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From the President's desk...



India is a land of spirituality. It boasts of a rich spiritual lineage. It was and still is home to many divine souls, saints, yogis and gurus who all through their deific powers have unraveled many dominant truths about the universe. While the origin of bhakti (devotion), yoga and meditation are common knowledge, we cannot forget those scientific geniuses that postulated numerous scientific truths that form the basis of modern science and math.

Almost every state of India has given birth to such brilliant minds. The list of such geniuses that have lived in India is an extremely long one. One is sure to miss some great names. Yet, as Indians who live outside of India it is extremely important to learn about her scientific past and about which not much mention is made. Let us be proud to be Indian! Jai Bharatavarsha! The process of gaining knowledge always begins with a prayer to Mother Saraswati. Let us all chant:

“Namaste Sharade devi Kaashmira pura vaasini (Salutations to you Sharada, O Goddess, O one who resides in Kashmir) Tvaam-Aham Praarthaye Nityam Vidyaa-Daanam Ca Dehi Me (I pray to you daily, please give me the charity of knowledge)”.

In this issue of Vidyadayani, what could be better than to pay our respects to those fountainheads of scientific knowledge that resided in India?

On this auspicious occasion of Saraswati puja, we extend our best wishes and regards to all devotees. Please come and partake in the Saraswati puja celebrations on January 20, 2018. We sincerely thank all attendees, volunteers, patrons, executive members and performers for contributing to making this event a great success.



Biswarup Chattaraj

Vidyam Dehi Namah-stutey

By Partha Sarathi Chakraborty
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With a renewed enthusiasm and continued expectation of generous patronage from the Indian diaspora as in the last four years, Samhita Cultural Association of Arizona (nicknamed *AZ Samhita*) is again preparing to successfully celebrate Saraswati Puja this new year on 21st January, 2018 (Sunday) at the Community Center in Downtown Chandler (125E Commonwealth Avenue, Chandler AZ 85225). This time with a rejuvenated vigor mixed with the traditional fervor. True to its meaning (*to unite*) and motto (*to Embrace, Share and Celebrate*), the AZ Samhita executive team brings together participation from a broad multicultural spectrum of the local Hindu Indian-origin population (be it linguistic, regional, etc.). As the fellowship gets stronger with the showcase of talent and cultural passion at every event, this attraction brings in folks of other nations as well, interested to know more about the Indian culture.

Saraswati Puja (a.k.a. *Vasant Panchami*) is a Hindu festival celebrated on the fifth day of 'Shukla Paksha' (bright half of the lunar cycle) in the Indian traditional calendar month of 'Magha'. This day typically coincides with the months of January or February in the Gregorian calendar. 'Vasant Panchami' specifically means 'the fifth day of spring', and thus this festival heralds the beginning of spring. The date marks the auspicious Saraswati Puja celebrations in eastern, northern, central, parts of western India, and in Nepal.



This festival is traditionally celebrated in various ways at different parts of the Indian subcontinent. AZ Samhita celebrates this on a weekend day closest to the calendar date, to enable strongest participation from the community. As per Hindu scriptures, Goddess Saraswati (daughter of Lord Shiva and Goddess Durga) was born on this day. Saraswati Puja is thus primarily celebrated to worship Goddess Saraswati (also spelled as *Sarasvati*), revered as the ancient Hindu Goddess of learning, language, knowledge, wisdom, music, and all forms of art. She (being the divine consort of Lord Brahma) symbolizes the source of all forms of creative energy and power that exists in nature (in its purest form), including love, life, light, truth, and reality.

Goddess Saraswati is referred accordingly in every major ancient and medieval Hindu literature. In Hindu mythology, She is part of the trinity (a.k.a. *Tridevi*) based on the 'Devi Mahatmya' in 'Markandeya Purana'. Embedded into the 'Sankhya' philosophy of the three 'Gunas'



(*tri-gunas*), She is known as 'Mahasaraswati' (*creator, Sattvic*) and is thus central to key Hindu religious texts like the Bhagavad Gita.

Saraswati, etymologically is a fusion of two Sanskrit words 'sara' meaning 'essence', and 'sva' meaning 'one-self'; thus their union means 'essence of oneself', and Saraswati means 'one who leads to the essence of self-knowledge'. The word 'Saraswati' was first referred to as a deity in the Rig-Veda (oldest Hindu text). Goddess Saraswati is also worshipped traditionally in different regions of India; in other oriental countries like Myanmar, Indonesia, Japan, etc; and in other religions like Buddhism.

In Hindu images, She is depicted as dressed in a pure white sari, seated on a white lotus, symbolizing light, knowledge and truth. She thus embodies knowledge and experience of the highest reality. Her symbolism lies typically in white themes from Her dress to Her 'vahana' (divine vehicle) 'hamsa' (*swan*) – the white color implies 'Sattwa Guna' or *purity*, manifested by an ability to identify true knowledge, insight and wisdom. She is generally shown to have four arms, but sometimes just two. The four hands symbolically mirror her divine husband Lord Brahma's four heads, representing *manas* (mind, sense), *buddhi* (intellect, reasoning), *chitta* (imagination, creativity) and *ahamkara* (self-consciousness, ego). While Brahma represents the *abstract*, Saraswati embodies action and *reality*.

Each of Her four hands hold items with symbolic meanings – a *pustaka* (book), a *mala* (garland), a *water pot*, and a *veena* (a stringed musical instrument). The 'book' symbolizes the Vedas representing universal, divine, eternal, and true knowledge including all forms of learning. The 'mala' represent the power of meditation, inner reflection and spirituality. The 'pot of water' represents the purifying power to distinguish right from the wrong, clean from the unclean, and essence from the inessential. The most observable feature on the image is the *veena*, representing all creative arts and sciences, and Her holding it

symbolizes the expression of knowledge that creates harmony. Saraswati is often associated with *anuraga*, the love for rhythm of music representing all emotions and feelings, expressed in the form of speech or music. Her 'vahana' (divine vehicle) is a white *hamsa* (swan), often located next to her feet. The 'divine white swan' is a symbolism for righteousness, spiritual perfection, transcendence, and moksha. In Hindu mythology, the *hamsa* is a sacred bird, symbolically embodying the unique ability among the animal world to differentiate good and evil, essential from the superficial, and eternal from the evanescent.

This festival reflects the spring season with colors as observed in the agricultural fields of India with yellow flowers of the ripening mustard crop. Hindus associate yellow as Saraswati's favorite color for offerings. Devotees dress in yellow, give yellow offerings for worship, and then share the yellow colored snacks, sweets, and saffron rice offerings as



Saraswati Puja is widely considered as the most auspicious day to start foundations of education in life – an ability to read and write. Pre-school children are initiated in reading and writing on this day. Children are encouraged to write their first alphabet on a slate board using a chalk ('khori') held with their hands ('Hatha') during this auspicious day, implying a sacred prelude for a life-long learning

with blessings from the Goddess. This ritual is referred to as the 'Hathe-Khori' ceremony for a pre-school kid in eastern India.

Traditionally, Saraswati Puja worship is normally performed during the early morning hours, accompanied with 'pushpanjali' (prayer with offering of flowers). Apart from other seasonal fruits, 'Kul' (or *Indian plum, Jujube, boroi, ber*) are offered to the Goddess and later eaten as 'prasad'. Some people traditionally refrain from eating plums before the Saraswati Puja as an age-old belief. 'Palash' flowers blooming in the spring season is an important offering for this puja (also 'Shiuli' flower). 'Amra mukul' or the *mango flower*, another regional Indian speciality and an essential offering, gets placed on the 'ghat' (the small water-filled holy pot) in front of the deity to invoke the Goddess into the idol. After the puja, traditionally devotees eat a vegetarian meal, typically consisting of 'khichri', 'torkari' (mixed vegetables), and 'bhaja' (fried vegetables) along with 'kuler chatni' (chutney made from plums). Each year on this auspicious occasion, students offer their textbooks and pens to the holy deity for blessings to succeed in their studies. Inkpots filled with milk and bamboo quills are offered; which are then used by devotees after the worship is completed to write 'Aum Namoh Saraswatay Namaha' on 'Bel' (*bael* or *wood-apple*) leaves (*Bilva-patra*) as a mark of respect to the Goddess.

With the presence of a knowledgeable and devotee-friendly priest, a very able executive-committee, and strongly committed core-members, AZ Samhita will be following most of these popular traditions and rituals, including the use of a Saraswati idol seated on a specially decorated (by the members of the organization) platform.

These traditional rituals performed are 'pushpanjali', 'homam' (holy fire), 'Saraswati pranam', 'Hathe-khori', with the use of 'Amra Mukul', 'Bilva Patra', inkpot, bamboo quills, 'kul', yellow flowers and offerings. Worship will be accompanied by the familiar sounds of 'dhaak' and 'shankha' (conch-shells). The worship will be concluded in the morning by distribution of 'prasad' to all devotees (as part of a sumptuous lunch), which include offerings (bhog) to the Goddess.

In reverence of what Goddess Saraswati symbolize, AZ Samhita will be celebrating a meticulously organized cultural program in the afternoon with well-rehearsed song and dance routines, along with other performances, and an art competition. The cultural program will be performed on-stage accompanied by a gorgeous backdrop decoration, creative lighting, and an excellent sound system. The cultural program will be punctuated by the offer of tasty snacks for all participants to enjoy.

To underline what the Goddess embodies, a special edition of the AZ Samhita literary magazine will be published. Taken together, all these key contributions from the participating members and visitors at every step of the celebration will reinforce strength of the AZ Samhita organization in planning and execution of such hugely popular events that bind together people in the valley with meaningful cultural and traditional tie; built with a friendly rapport and camaraderie. The resulting experience will be something to cherish round the year for all the participants and visitors; both young and old.

Please visit the AZ Samhita Facebook page at <https://www.facebook.com/groups/azsamhita/> or the website www.azsamhita.org to know more about the organization, their upcoming events and to patronize their noble cause by joining the



Scientific geniuses of ancient India

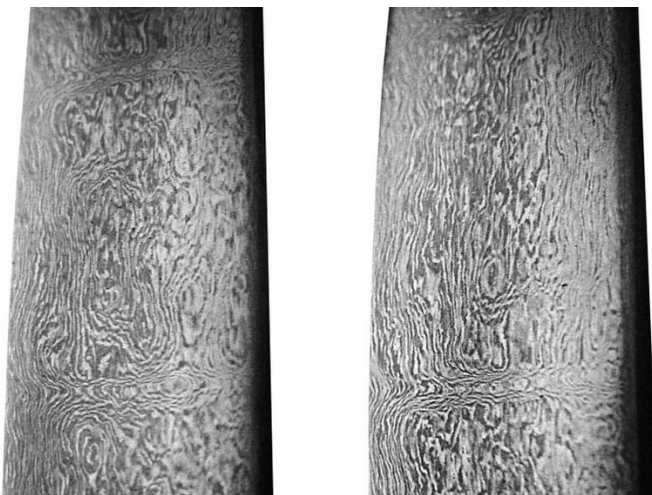
Raghunandan Kalambatti (raghunandan.kalambatti@gmail.com)

“We owe a lot to the ancient Indians, teaching us how to count without which most modern scientific discoveries would have been impossible.” – Albert Einstein

One of the oldest civilizations in the world, the Indian civilization has a strong tradition of science and technology. Ancient India was a land of sages and seers as well as a land of scholars and scientists. Research has shown that from making the best steel in the world to teaching the world to count, India was actively contributing to the field of science and technology centuries long before modern laboratories were set up. Many theories and techniques discovered by the ancient Indians have created and strengthened the fundamentals of modern science and technology. While some of these groundbreaking contributions have been acknowledged, some are still unknown to most.



Wootz Steel



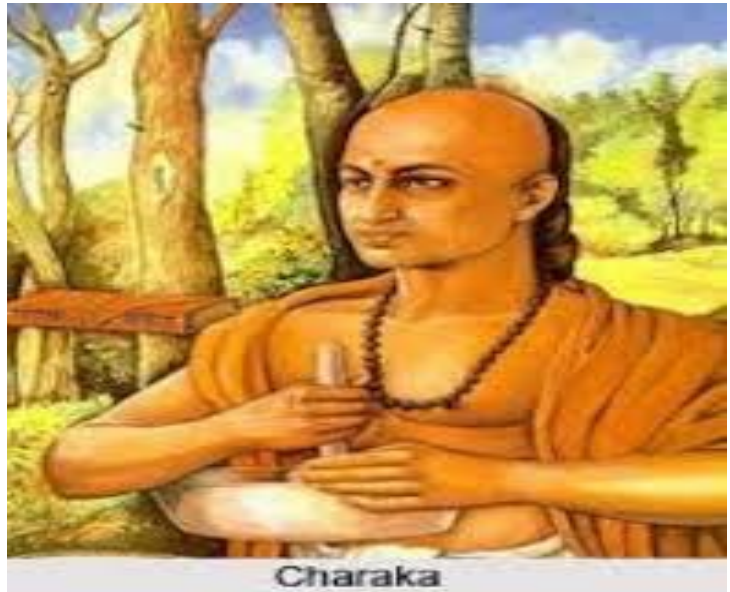
From numerical notations to seamless steel and from zero to gravity, ancient Indian scientists were immersed in giving humongous contributions to science while the rest of the world still lived in caves. Let us, in the following pages familiarize ourselves with some of those scientific geniuses of ancient India and their works.

Wootz Steel A pioneering steel alloy matrix developed in India, Wootz steel is a crucible steel characterized by a pattern of bands that was known in the ancient world by many different names such as UkkuHindwani and Seric Iron.

This steel was used to make the famed Damascus swords of yore that could cleave a free-falling silk scarf or a block of wood with the same ease. Produced by the Tamils of the Chera Dynasty, the finest steel of the ancient world was made by heating black magnetite ore in the presence of carbon in a sealed clay crucible kept inside a charcoal furnace.

Acharya Kanad (the original father of atomic theory)

Acharya Kanad was born in Prabhasa (Dwaraka) in Gujarat around 600BCE. He came up with the idea that “anu” (atom) was an indestructible particle of matter. The atom is indivisible because it is a state at which no measurement can be attributed. He used invariance arguments to determine properties of the atoms. He also stated that anu can have two states — absolute rest and a state of motion.

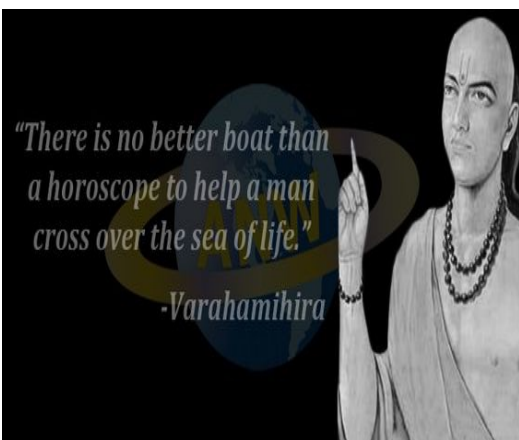


Acharya Charak (Father of Medicine)

Charak (600-500 BC) was one of the principal contributors to **Ayurveda**, a system of medicine and developed in **ancient India**. He is famous for authoring the medical treatise, **Charaka Samhita** that has a description of 2000 medicines and cures for diseases in almost every part of the body. Charaka was a resident of Kapisthala (Kapurthala probably) village situated in Panchanada (**Punjab**). He is well known as the "**Indian father of medicine**". The following statement is attributed to Acharya Charak:

“A physician who fails to enter the body of a patient with the lamp of knowledge and understanding can never treat diseases. He should first study all the factors, including environment, which influence a patient's disease, and then prescribe treatment. It is more important to prevent the occurrence of disease than to seek a cure.”

Varahamira (astrologer and astronomer)



Varahamira was one of the greatest mathematicians and astronomers who lived in Ujjain (505-587AD). His work **Brihatsamhita** discusses topics such as descriptions of heavenly bodies, their movements and conjunctions, meteorological phenomena, indications of the omens these movements, conjunctions and phenomena represent, what action to take and operations to accomplish, sign to look for in humans, animals, precious stones, etc. Another famous work is **Pancasiddhanta**, a masterpiece on mathematical astronomy. Varahamira has also made important discoveries in trigonometric formulae.

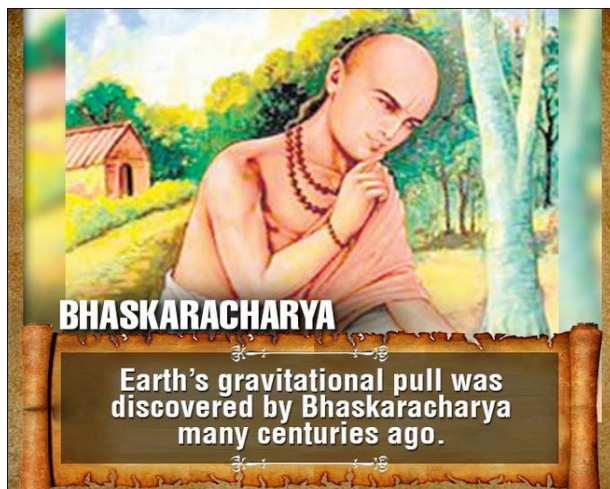
Bhaskara I (mathematician)



Bhaskara I (600 – 680 AD) was born perhaps in Saurashtra and died in Asmaka (former Andhra Pradesh). He was the first to write numbers in the Hindu decimal system and give a circle to represent zero. His fame rests on three treatises he composed on the works of Aryabhata, *Mahabhaskariya* (“Great Book of Bhaskara”), *Laghubhaskariya* (“Small Book of Bhaskara”) and *Aryabhatiyabhashya*. In *Mahabhaskariya* he gives a formula for calculating the value of a Sin X. The formula is amazingly accurate. The book also discusses topics such as: the longitudes of the planets; conjunctions of the planets with each other and with bright stars; eclipses of the sun and the moon; risings and settings; and the lunar crescent.

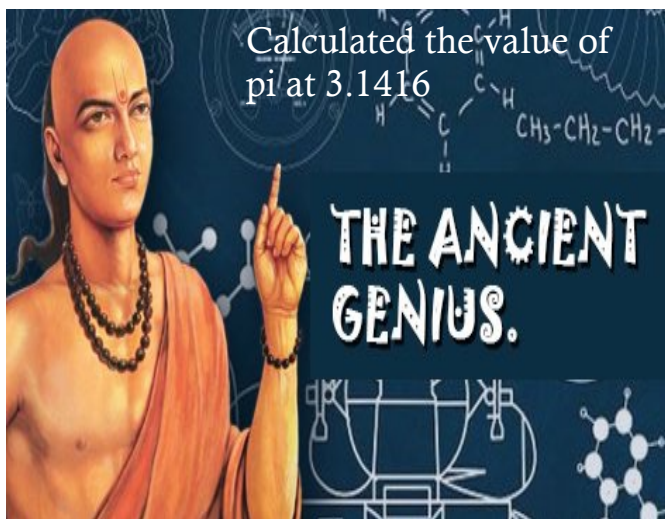
Bhaskaracharya (genius in Algebra)

Bhaskaracharya or Bhaskara II (1114-1185 AD) was born in Bijapur Karnataka. He has been called the greatest mathematician of medieval India. His main work **Siddhanta Shiromani** has four sections, which deal with arithmetic, algebra, and mathematics of planets and mathematics of spheres. Bhāskara's work on calculus predates Newton and Leibniz by over half a millennium. He is particularly known in the discovery of the principles of differential calculus and its application to astronomical problems and computations. He was the first to discover gravity, 500 years before Newton. In *Surya Siddhanta* he writes:



"Objects fall on earth due to a force of attraction by the earth. Therefore, the earth, planets, constellations, moon, and sun are held in orbit due to this attraction."

Aryabhata (mathematician)



Aryabhata, also called **Aryabhata I** (born 476 AD) was an astronomer and the earliest Indian mathematician who flourished in Kusumapura, near Pataliputra (Patna), then the capital of the Gupta dynasty where he composed at least two works, **Aryabhatiya** and the now lost **Aryabhatiyasiddhanta**. The mathematical part of the **Aryabhatiya** covers arithmetic, algebra, plane trigonometry and spherical trigonometry. It also contains continued fractions, quadratic equations, sums-of-power series, and a table of sines. The *Aryasiddhanta*, a lost work on astronomical computations, it is speculated that he was the head of the University of Nalanda. He calculated the value of pi to several decimals. It was Aryabhata who insisted that the earth rotates round its axis.

Sushruta(father of plastic surgery)

Sushruta, one of the earliest surgeons of the recorded history (600 B.C.) is believed to be the first individual to describe plastic surgery. Sushruta who lived nearly 150 years before Hippocrates vividly described the basic principles of plastic surgery in his famous ancient treatise **Sushruta Samhita**. It is said that he lived in the area around present day Varanasi. 'Sushruta Samhita which describes the ancient tradition of surgery in Indian medicine is considered as one of the most brilliant gems in Indian medical literature. In the book's 184 chapters, 1,120 conditions are listed, including injuries and illnesses relating to ageing and mental illness and many chapters on the training and practice of surgeons. It also describes over 120 surgical instruments, 300 surgical procedures and classifies human surgery in 8 categories. Sushruta is truly the father of surgery and especially plastic surgery.



Baudhayana (father of geometry)

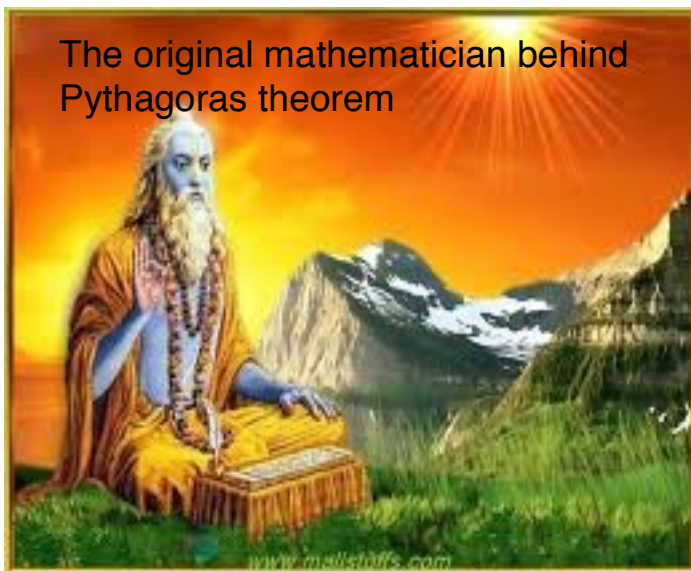
Baudhayana was a mathematician who lived around 800 BCE. He is the author of **Baudhayana sutras**, which contains six texts. One of them **sulabhasutras** contains calculations of value of pi, Pythagoras theorem, square root of 2 and circling the square. He is credited what is now called the "Pythagoras theorem" before Pythagoras had developed it.

He was a man of very considerable learning and probably wrote the Sulabhasutra to provide rules for religious rites.



Kautilya (Acharya Chanakya)

Kautilya or Chanakya also known as Vishnugupta (311-283 BCE) was a teacher, philosopher, economist, jurist and prime minister of Indian Emperor Chandragupta Maurya. He was initially a professor of economics and political science at the Takshashila University (in present day Pakistan). He authored the ancient Indian political treatise **Arthashastra**. The work includes books on the nature of government, law, civil and criminal court systems, ethics, economics markets and trade, the methods for screening ministers, diplomacy, theories on war, nature of peace, and the duties and obligations of a king.



Brahmagupta (mathematician)

Brahmagupta, (598–665 AD) born and lived in Bhillamala [modern Bhinmal], Rajasthan), was one of the most accomplished of the ancient Indian astronomers. He is famous for **Brahma-sphuta-siddhanta** (“Correctly Established Doctrine of Brahma”), an astronomical work and **Khandakhadyaka** (“A Piece Eatable”), an astronomical handbook that employed Aryabhata’s system of starting each day at midnight. In chapters 12 and 18 in particular, he laid the foundations of the two major fields of Indian mathematics, **pati-ganita** (algorithms) and **bija-ganita** (equations). He stressed the importance of these topics as a qualification for a mathematician, or calculator (ganaka). Brahmagupta gave rules for dealing with zero as a number and for arithmetical operations among negative numbers (“debts”) and positive numbers (“property”), as well as surds. He also gave partial solutions to certain types of indeterminate equations of the second degree with two unknown variables. Perhaps his most famous result was a formula for the area of a cyclic quadrilateral (a four-sided polygon whose vertices all reside on some circle) and the length of its diagonals in terms of the length of its sides. He also gave a formula for computing sine ratios in trigonometry.



Acharya Nagarjuna (wizard of chemistry)

Nagarjuna (150-250AD) was a revered Buddhist philosopher, alchemist and ayurvedic physician born in the Vidharba or Andhra area. He tried to transform base elements into gold, like the alchemists in the western world. Even though he was not successful in his goal, he succeeded in making an element with gold-like shine. Till date, this technology is used in making imitation jewelry. In his treatise, **Rasaratnakara**, he has discussed methods for the extraction of metals like gold, silver, tin and copper. He was an ayurvedic physician. Nagarjuna has been credited with explaining the circulatory system and blood tissue. He was also known as the “father of iatrochemistry” because of his work on the benefits of specifically treated minerals known as “bhasmas”. The most important contribution of Nagarjuna to Buddhism is the concept of “sunyata” or emptiness. He was a teacher at Nalanda University and came to be known as Acharya.

Acharya Nagarjuna (100 A.D.)

Nagarjuna (100 AD)

Acharya Nagarjuna was the first Indian who produced chemical, metallurgical inventions and discoveries.

Nagarjuna proposed the “Theory of Rasa Vada”.



C. V. Raman



Srinivasa Ramanujan



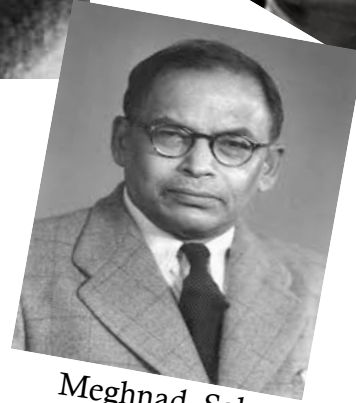
Homi Bhabha



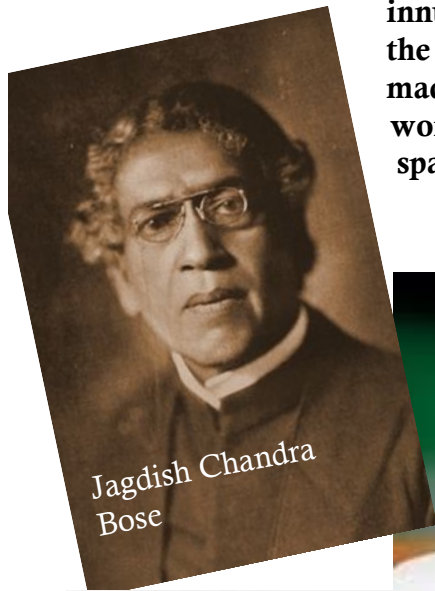
S. N. Bose



Vikram Sarabhai



Meghnad Saha

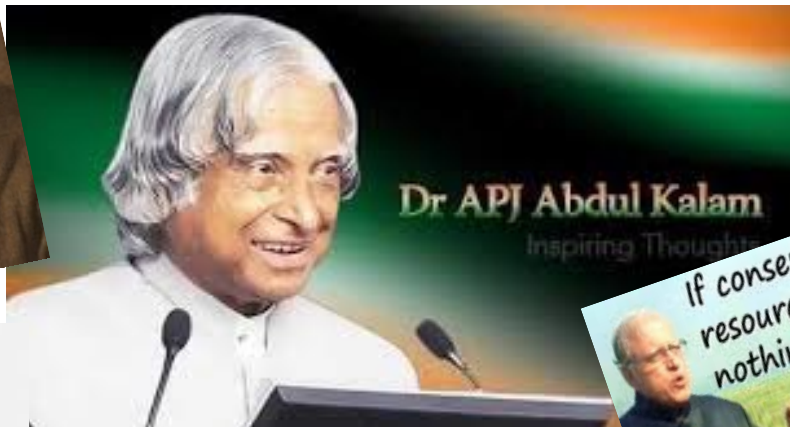


Jagdish Chandra Bose

Mother Saraswati has blessed India with innumerable scientists of international repute in the nineteenth and twentieth centuries. They have made a mark for themselves and for India in the world in physics, chemistry biology, mathematics, space, aeronautics and artificial intelligence.



Jayant Narlikar



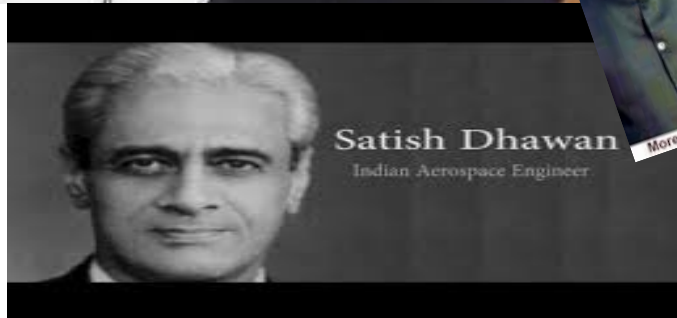
Dr APJ Abdul Kalam
Inspiring Thoughts



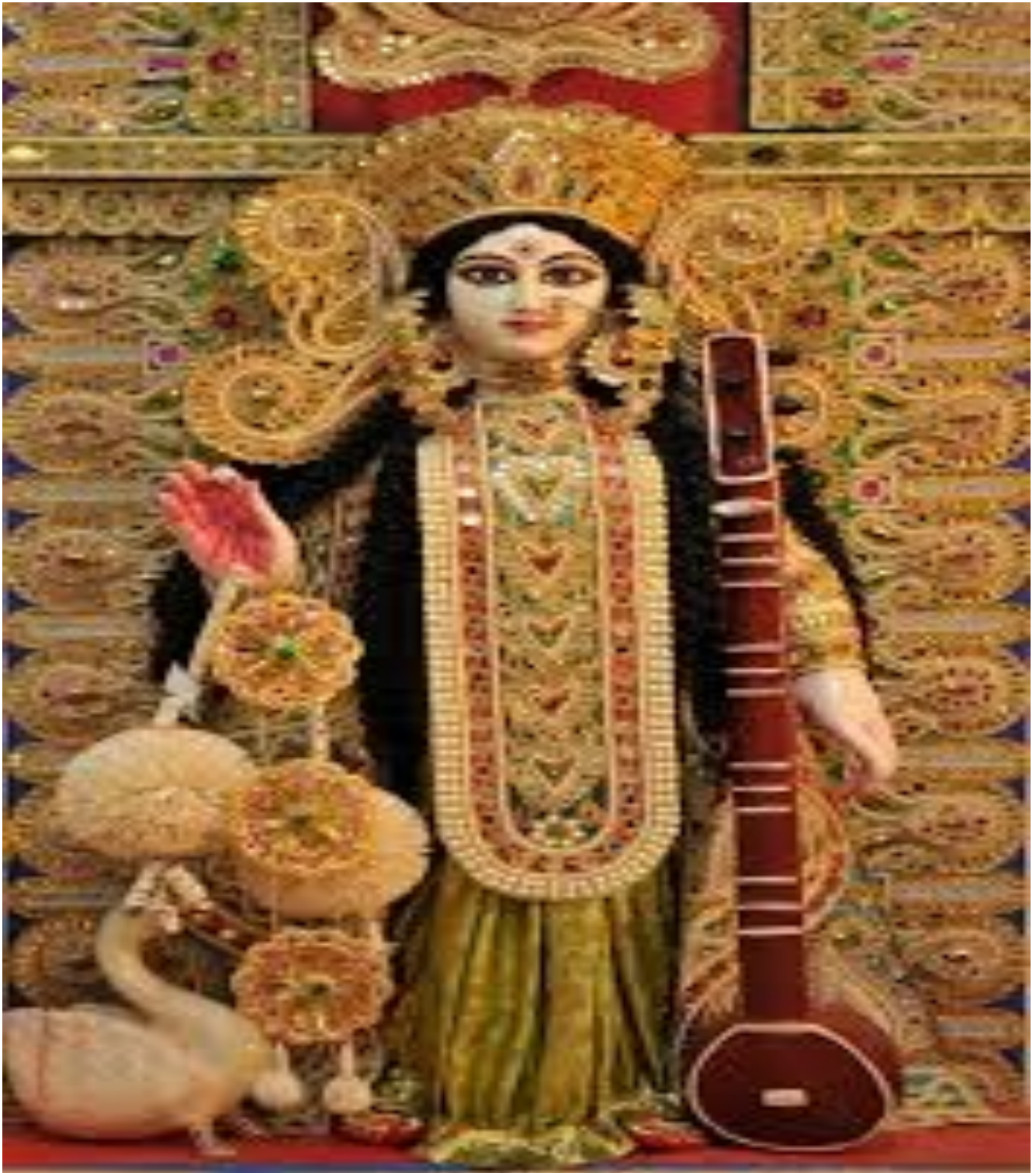
—M. S. Swaminathan
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G. N. Ramachandran



Satish Dhawan
Indian Aerospace Engineer



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