

# *Science in* **VEDA**

A hand holding a glowing Vedic lamp (diya) over a brass oil lamp. The background is dark and textured.

**D.R. KHANNA**

# Science in Veda

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***D.R. Khanna***

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# Preface

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Blind faith in the Vedas has led the Hindus to consider them as an unlimited source of knowledge and even trace their authorship to God. In the last century, when discoveries and advancement of science began fast changing life patterns around the world, the reaction was varied. Some were for all out support to the scientists to go ahead, while others preached caution. And even as the controversy continued, the expanding horizons of science encouraged the spirit of competition and generally increased appetite for knowledge. Vedas are considered as an ocean of knowledge. Every bit of Vedas is very important each stanza, each line, each word has a significant meaning to it. For the language also supports its purpose. It is said that Sanskrit is the only nearest language which could be used to explain or describe anything clearly and specifically. It is the only Vedic Dharma where religion and Science go in hand to hand. The Vedas contain in them the gems of all true sciences.

The Book Science in Veda deals with the combined approaches of modern science and ancient Vedic science. As we know that Indian Scriptures and Sanskrit literature is the storehouse of knowledge. As we go through this literature they have innumerable illustrations of Science, technology, arts, music, dance, environment, architecture, vehicles etc. The present book is an attempt to explore the knowledge of science, penetrate the mystery of the Vedas and to search out in them the various branches of Science.

The Book Science in Veda is divided into ten chapters describing the importance of water as described in our vedic literature.

***D.R. Khanna***

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# **Chapter 1**

## **The Cosmological Code of Nasadiya Sukta in Rigveda**

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### **Introduction**

Recent scientific discoveries seem to validate the concept of Vedas. Physicists and Cosmologists are close to proving that science and Vedas seem to be saying the same thing. The purpose of this article is to explore the relationship between the concepts of Big Bang Theory of origin of universe and basic ideas in the Nasadiya Sukta of Rigveda. We shall see how the two foundation of twentieth century, Physics Quantum Theory and Theory of Relativity both force us to see the world very much in the way Vedas and Upanishads see it. Creation is accompanied by the severest austerities—tapas of God. The word tapas also means heat. The whole universe was in a concentrated form which is mentioned as a point or bindu. The whole universe was in a single infinitesimal point, one single bindu, out of that explosion occurred. This theory is known as Big Bang theory. The seeds of Big Bang theory lie in Nasadiya Sukta of the Rigveda. Here it is shown that Nasadiya Sukta of Rigveda concurs with basic concepts of Big Bang theory of the origin of the Universe.

The question of the origin and evolution of the Universe fascinated mankind since long. Different civilizations, religions and cultures formulated their own interpretation.

There are some long standing questions about the Universe. Some of them are as follows:

1. Where did the universe come from?
2. How and why did it begin?
3. Will it come to an end and if so how?

These are questions that are of interest of all of us. In order to understand origin of universe scientists devise theories or models called cosmological models which gives descriptions of the universe that can be checked against observation. Most of the theories are based on general theory of relativity, quantum mechanics and gravitational law of attraction. There are basically two types of cosmological models:

1. Hot Big Bang Model
2. Steady State Model



The third one is Quasi Steady State Cosmology (QSSC) model which is modified form of steady state model. Jayant Vishnu Narlikar and his colleagues Fred Hoyle, Geoffrey Burbidge proposed this theory in 1993.

Discovery of microwave background radiation by A.A. Penzias and R.W. Wilson supports the Big Bang theory of origin of universe. The background radiation distributed throughout the universe was interpreted as a relic of Big Bang. The Big Bang theory based on Einstein's general theory of relativity was proposed by Alexander Fred Mann in 1922. According to Big Bang theory Universe began under extreme conditions approximately 15 billion years ago. The expansion of universe began on explosion of space at the beginning of time.

The biography of the Universe account for every thing in its nearly 15 billion years history except for an extremely small factors of second ( $t < 10^{-43}$  sec) after Big Bang. As the universe cooled by expansion the unified field which was present at every close to the Big Bang beginning, subsequently unfold creating everything. As the universe expanded, both its temperature and density quickly dropped. This 'thinning out' and 'cooling' led to a series of practically instantaneous events highly significant for the present universe. Some of these were

1. Gravity breaks away from the unitary primeval force (unified force) as a separate entity, it happened shortly after  $10^{-43}$  second and it soon become much weaker than other force.
2. The second of the four forces, the weak force breaks away and establish its own identity. Temperature dropping quickly and a little latter it is followed by electromagnetic and the strong nuclear force. By the end of the hadron era [ $t = 10^{-43}$  sec to  $t = 10^{-4}$  sec. Temperature ( $^{\circ}\text{K}$ )  $T = 10^{32}$  to  $T = 10^{13}$  and density  $\rho = 10^{94}$  to  $\rho = 10^{14}$  gm/cm<sup>3</sup>] all forces have separated out and have changed significantly in strength.
3. Neutrinos decouple and begin to expand freely rather than being maintained in a thermal equilibrium with other constituents of the Universe. There should be a cosmic neutrino background as a result of this event.
4. Next, the decoupling matter and radiation makes the universe transparent to electromagnetic radiation detectable today as cosmic wave background. The universe has become radiation dominated.
5. The first atomic nuclei begin to form with the generation of helium in a ratio of about one helium nucleus to three hydrogen nuclei (protons). This is about the relative cosmic abundances of these two elements observed today.
6. With the energy density of the universe now low enough the electrons begin combining with nuclei to form stable atoms for the first time.
7. The essential constituents of the universe gave now all been established and it only remains for the matter to organize itself into the stars, galaxies and clusters of the galaxies.

This picture of Universe that started off very hot and cooled as it expanded is in agreement with all observation and evidence that we have today.

The Vedic seers had an intellectual urge to know how the Universe came into existence. How did the process start? What was the first principle or TATTVA that put the creative process into action. In fact there are several Sukta in Rigveda which provide us knowledge of force of gravitation, birth

of star and origin of the universe. Among the various Suktas of Rigveda Nasadiya Sukta has been most popular among scholars. Nasadiya Sukta makes its own contribution to our understanding of the origin of the Universe.

## Search Strategies

Many scholars of different countries esteem Vedic literature as it is the record of the ancient Indians' astronomical observations in disguise of the offerings to the gods who are none but the different celestial bodies or natural phenomena. The vedic seers realized that their profound knowledge would not be easily understood by common people and for this they represented the heavenly bodies etc. as gods and their motions as 'ratha' (Chariet) striding, etc. They stored their observational facts and the data of their research in verse in a cryptic language, as apparently these are nothing but the offerings to the gods.

To explore the cosmology and astronomy we have to depend on some procedures namely:

1. The hymns of vedas are interpreted by the finding the proper meanings of the words out of the possible meanings.
2. The inner meanings are unfolded through proper interpretations of the words.
3. The cryptic and metaphoric descriptions are deciphered.
4. The method of transcription by 'Katapayadi sutra' to the verse written in secret language is applied.

Meanings and interpretations of words used in this manuscript are based on Madhusudan Ojha's work entitled '*Desavada rahasya*' and A. Bhattacharya's work on ancient astronomical terms and their interpretation in the light of modern Astronomy, Calcutta. In our research work, we like to demonstrate how these methods can be made fruitful to Nasadiya Sukta in extracting advanced science and astronomy.

## Results and Discussion

Nasadiya Sukta contains seven mantras:

### Mantra 1

दीकीपददयं कीपज्जं की दयत दीपकतंय  
दय अलयती वलय लंय य  
जपतीअतपओ जनी जेल तंयददवी  
जपतंपकहीदत हजीयतत यय

**[Rigveda Ch. 10, 129,1]**

[The *rishi* says that there was neither *sat* nor *asat* at that time, *i.e.* at the time of the creation of the universe. There was no space, nothing else were present. Then what covered on? Where? The deep primordial waters also were not there at that time.]

At the time of the creation of universe the root cause which brings back the cosmic again cannot be named as 'asat' *i.e.* cannot be said to be non-existent because such thing cannot give rise to this universe. It cannot be called 'sat' also because nothing perceptible was present at that time. Actually author of the Nasadiya Sukta is going to say that 'sat' and 'asat' both existed together. He is going to

uphold the concept of singularity at the time of Big Bang.

Singularity is the end of the road. Singularity is a place (or a point) where space and time simply disappear. At singularity normal concepts of space and time breakdown. Stephen Hawking and Penrose went on to prove that not only could the universe begin in a singularity but that is actually it had begin in a singularity. This singularity that Stephen Hawking and Penrose uncovered with their calculation is mathematically an event in space time where physical behaviour breaks down. You cannot figure out when and where something is going to happen if you do not have a clear background of time and space. We certainly cannot use science to tell us what existed before Big Bang. It shows that singularity was neither 'sat' or 'asat'. Then is not our sage scientifically correct.

The sage says that there were no (*vyoman*) space at that time. There was nothing to be covered or protected at that time and therefore no principle of envelopment existed. The word 'Kuha' means that there was no place to support to carry out the act of envelopment.

According to Big Bang theory universe was created under critical conditions. At the Big Bang itself is thought to have had zero size and so to have been infinitely hot. A very short time after the Big Bang space and time did exist in the way we think of them today. The Universe began as an infinitely dense cosmic singularity that expanded explosively in the event called Big Bang. It was not just matter that was created during the Big Bang. It was space and time were created. So in the sense that time has a beginning, space also has a beginning.

In this mantra says a poetic fashion by questioning what covered on? Where? By the first question he tells that some matter was created at some point. He is indicating toward the concept of Big Bang. This also shows that space was created which was covered by some matter. Big Bang theory agrees with this view.

The word 'Ambhas' usually means water. The root ambha means to sound. Hence *ambhas* should be taken as material producing sound. For that thing which originated in the space and which was very vast and unfathomable. The sage has coined a new word *ambhas*. Thus the word *ambhas* (sound producing matter) is scientific and appropriate. The sound that was created during Big Bang was the sound of *Om*.

In the first line if mantra the sage tells that there was nothing and in the next line he questions what covered on. Thus poetically he suggested that formation of *ambhas* took no time. Stephen Hawking, like most theoretical physicists now believes that the secret of the most elusive of all goals lie in the very early universe the period within the first trillionth of a second after the beginning of the Big Bang.

In the second line of Mantra the sage put the question "For whose shelter all this was prepared?" The sage did not know the answer so he has put forth his question to all the wise man. This question is still unanswered by the modern scientists.

## Mantra 2

दं तज्जलनाभीपकउत्तज्ज दं जशीम दं तज्जाली  
दीं मज्ज जतामजी य  
विपकजीज्ज'कील जकमात्त जेत्तीककीदलबदं  
वली पत्तबदी दग्ग

[Rigveda, Ch 10, 129, 2]

[The second mantra states that there was neither death, nor immortality. There was no indication of day or night. There was only that one breathing without air with its own energy. There was nothing

else.]

The Seer's statement that there was only that one thing at the time of the birth of universe is accepted by all modern cosmologists. At the very instant of its creation, all matter and all four fundamental forces (gravitational force, electromagnetic force, nuclear force and weak interaction) were indistinguishable from each other. Sheldon Glashow, co-winner of the noble prize for his work with grand unified theories, once told, "When the universe was very, very hot, we believe that all the forces may have been one." That one underlying, seemingly magical force is what we are all now working to discover. According to Stephen Hawking when universe was about  $10^{-43}$  of a second old, the four fundamental forces we see in our cold stable universe were probably one. As the universe expanded and cooled, matter and force split apart and then split again. It begins to suggest that there was a common origin for everything we see today in the Universe. It is presumed that gravity has just broken its bond with the single unified force that existed at the instant of the Big Bang at the wall of Plank time comes at  $10^{-43}$  sec. We do not yet have a proper quantum theory of gravity which unifies with other fundamental forces.

In second mantra, the sage is indicating towards the single unified force at the very close to Big Bang. The physicists now realize that these division of fields (*i.e.* four fundamental forces like gravitation, electromagnetic, nuclear and weak forces) are nothing but different aspects of a single entity, the unified field.

The Rishi (*rsi*) says that there was only one primeval principle (*Mula Tattva*) which breathed without air for the sake of creation. The *prana* is only an outward indication of the fact that the entire cosmos to be created is already within this *Mula tattva*. During creation it only comes out just like air comes out from the lungs when we breathe out.

In this Mantra sage says that there was neither death nor immortality. This statement is true because there was no sun and no earth like there was no indication of day or night. This is also correct because unless there is a planet, rotating and travelling around a sun, there cannot be any day or night.

### Mantra 3

जतं यिजजतौ हनसीततमवामजतं समसतं तमंती यजतं अ  
जनबलीलमवद्विभ्रं यजतं लवीयजतं जवतीयदी वलजपातं दम

**[Rigveda, Ch. 10, 129, 3]**

[There was darkness to begin with, there was something mysterious in the darkness. It was impossible to understand. It was all undulating matter (*Salil*). *Abhu* originated from the surrounding was wrapped by lighter material. It developed further due to might of heat.]

The universe soon after its origin in the Big Bang passed rapidly through states of very high temperature from 1S–200S (approximately three minutes), when temperature of the universe dropped from  $10^{10}$ K to  $10^7$ K. At such high temperature free neutron and proton come together to form atomic nuclei. The time temperature relationship plays a significant role in early history of universe. The hydrogen atoms could not exist before 1 million years after big bang. The background photons prior to  $t = 1$  million years had energies greater enough to prevent electrons and protons from getting together to form hydrogen atoms. Only after  $t = 1$  millions years have these photons been red shifted enough to permit hydrogen atoms to exist.

Prior to  $t = 1$  million years, the universe was completely filled with a high energy photons

colliding vigorously with protons and electrons. This state of matter is called plasma, and it is opaque. During the first million years of the universe, matter and energy formed an opaque flame. In this mantra *Rsi* has indicated towards this opaque by saying that there was something mysterious in darkness.

About 1 million years after the big bang expansion and red shift caused the temperature of the universe to fall below 3000 K so that protons and electrons could combine to form hydrogen atoms. Hydrogen is transparent so the universe suddenly became transparent. The transition from an opaque to a transparent universe occurred roughly 1 million years after the Big Bang. Once atoms had begun to form then matter could condense into galaxies and stars and gravity could start playing an important role in the development of the universe.

All this description is put in a nutshell of single word ‘*Salila*’ by the sage. ‘*Salila*’ means a matter with play of ripples or waves. *Salila* is the cosmic soup and not ordinary water.

The separate clouds or gas drops formed from the cosmic gas are represented by an appropriate word ‘*Abhu*’. ‘*Abhu*’ means a thing formed from the surrounding material. *Abhu* originated from the surrounding was wrapped by lighter material. It developed further due to the might of heat.

#### Mantra 4

इतिउजकहतम उअतजजीकीप उदेंद  
तमजी वतजीउद लकीपज द  
‘जव इदकीनउजप दपतअपदकीतकप वतजपेली  
अंतव उदपी दद

[*Rigveda, Ch. 10, 129, 4*]

[The great worldly desire comes from the minute, invisible unworldly seed of mind in the same way ‘*Sat*’ came from ‘*asat*’. The learned with far reaching intelligence have recognised this fact after complete thinking in the mind and through scanning in their hearts.]

In the first stage of creation there arose a desire in the mind of the almighty to create. The good deeds of being in the previous *kalpa* culminated in the form of a seed of the cosmos in the mind of the creator at the time of creation.

The learned after deep thought came to conclusion that all action associated with the observed cosmos have their origin in the discernible source. Now scientists start thinking that the facts of the Big Bang as they are slowly uncovered could suggest the work of a creator or creative force.

Science seems to have uncovered a set of laws that within the limits set by the uncertainty principle tells us how the universe will develop with time, if we know its state any time. The ultimate essence of the universe is space, consciousness is but a condition of space. The contents of the world is the distortion (*Vikara*) or desire of its container, consciousness space. The distorted 3-D space is *Sagun Brahma*. The space minus its *Vikara* or distortion (or desire) that is the unified field is *Nirgun Brahma*. *Brahman*–space is the ultimate reality underlying all existence.

#### Mantra 5

जपतवेकपदव अपजजव तंतपतमीतकी  
‘अपकेपकनवतम’अपकेपज द  
तमजवकी ‘वतीपतव’वज्जेअकी  
अंजजवत लजपी वतैजज दद

[*Rigveda, Ch. 10, 129, 5*]

The strands or rays scattered out were they oblique or downward or upward? They became germ holders and became mighty. Those who tried to keep themselves aloof remained small or those who surrendered themselves became inferior while those tried hard became superior.

The sage questions whether rays are oblique or downwards or upwards? By this question the sage indicates that there were no real directions in space such as upwards or downwards and oblique. The seer is also indicating the special features of the universe. The universe is homogenous and isotropic over large distance scale. In small scales universe is highly homogenous and an isotropic. The universe is expanding. The general theory of relativity and Big Bang theory are based on these special features of the universe.

The *rsi* further says that cosmic matter which was scattered in the space start gathering due to gravitational astronomical bodies of different size were formed. Some of these held themselves aloof so they remained small. These are names as ‘*Swadha*’. Some bodies surrounded themselves to others. These are also ‘*Swadha*’. Other bodies absorbed more and more matter and smaller bodies by gravitational attraction and became enormous. These are named as *Prayati*.

Our universe contains various galaxies of different shapes and sizes. It also contains number of quasars, supernova, Nebula, stars, white dwarf, neutron stars and black holes. The galaxies generally presumed to form from a primeval hydrogen gas cloud. The galaxies in addition to stars also contains large quantities of gas and dust and this material is constantly being converted into stars, planets, satellites and asteroids. The same concept is given by the sage using words '*Swadha*' and '*Prayati*'.

## Mantra 6

॥ य कर्की अमकं । यी यत अकञ्ज नन निज  
 नन मल्ल अर्पेत्ययी य  
 तञ्जीहकमञ्जी ल अर्पेत्यदमदञ्जी य अमकल्लं  
 विज्ञीनञं यद्य

**[Rigveda, Ch. 10, 129, 6]**

[Who really knows? Who will be able to say from where this great universe came into being. The God is subsequent to the creation of the universe than who knows from what this universe originated?]

The Big Bang model provides a good frame work for understanding the early evolution and present structure of the universe. Many questions and ambiguities and neither addressed nor answered within the concept of the Big Bang model. For example it leaves a number of questions unanswered.

1. Why did the Big Bang occur?
2. Why was the early universe so hot?
3. Why, how and when did matter first appear in the universe?
4. Why is the universe so homogenous and isotropic over large distance scale?

The more we fine tune our outer vision and probe deeper into eternal questions, our limitation in relation to the vastness and mysterious of space become more apparent. Whether we see the cosmos through our mind's eye or through telescopic eye the enigma that is cosmos only gets deeper. This quality of a eternal mystery of the cosmos is brought out in 6th mantra of Nasadiya Sukta of Rigveda. In this mantra Rishi says it is very difficult for any body to say exactly how all that we see around us came into being. He says that he is well aware of the complexity of the problem.

## Mantra 7

॥सुत अपतेजपतलज इड्रीमं लकप अककीम  
लकप ओ द द  
लप लकीली वततम अलवतदेव द  
अमक लकप ओ द अमक दद

[*Rigveda, Ch. 10, 129, 7*]

[Who knows whether this universe is supported by the creator or not? Does he who is the highest authority of the universe and who is in the super space know it definitely or not?]

The sage tells here that universe is supported by its creator. Here sage suggest that probably that superior power knows how the universe is created and then he raised suspicion whether this is the final authority or is there anyone else superior still. Expressions of such doubts are very common among vedic seers. They were earnest seekers of truth.

The science has pointed very clearly in the direction of the Big Bang creation of the universe, but the cause of the Big Bang still remains very much enigma. The philosophers have often concluded that there must be a 'first uncaused cause' and this they have identified with God. The Big Bang theory of the beginning of the universe seems at first sight to satisfy their proof. Scientific explanations comes to an end, provided a God gives opportunity to ascribe the universe to a transcendent cause. A cosmologist can say nothing about transcendent causes.

Thus we can see that whatever cosmologist with all their ultra modern equipments say today about the origin and fate of the universe their seeds are already present in *NE Sadiya Sukta* of Rigveda.

## Conclusion

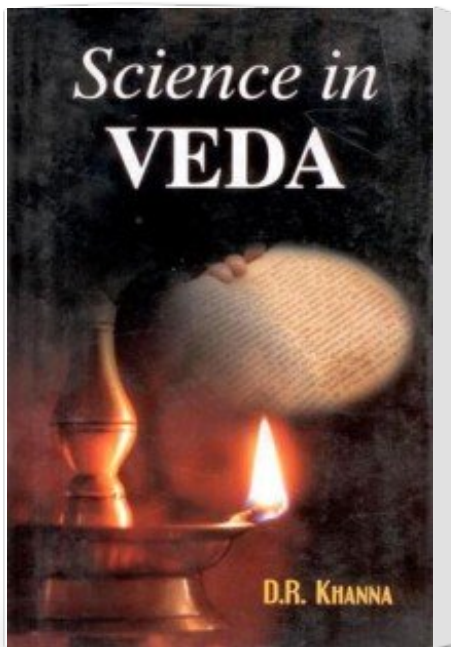
In conclusion we must say that there are two basic attempts in studying the vedas apart from the religious or philosophical aspects. First one is the usual tradition which is effort in finding some scientific facts regarding origin of Universe and birth of stars only at optimum level from the vedas to establish that these facts were discovered long before the western people were able to discover them. These researches should be encouraged as they contribute towards the history of science and astronomy.

The other aspects of the studies started from the belief of the people that the Vedas are the complete Science or Vijnana in the real sense containing both the *para* and *apara* knowledge. The belief has tempted the researchers to decipher the knowledge of various kinds from the vedas by applying different methods. Of course, these methods may or may not be the right keys in extracting the knowledge from the vedas, but these must be considered, to be basic steps towards finding the right key for proper utilization of treasure in the vedas.

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