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## ACHARAYA KANADA: FATHER OF PHYSICS AND TRUE INVENTOR OF LAW OF MOTIONS

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### **Abstract:**

*We have always studied that laws of motion, concept of electron, proton, neutron and atomic theory -all have been proposed by foreign scientists but the fact is totally different. All these theories have originated from India only. On one side our Vedas are rich in science and on the other hand science have been explained by Indian Philosophers too. This is our misfortune that we only considered those evidences and facts as philosophical base but when we observe those things with a scientific view, we came to know that the concepts were not a part of philosophy but true science. That philosophical fact have science to a great extent. One such type of literature is of Philosopher Kanada. In this paper we are going to explain the literature of Kanada especially laws of motion and discuss the facts hidden in it.*

**Keywords:-** Kanada, Law of Motion, Vaisesika Sutra, Philosophy

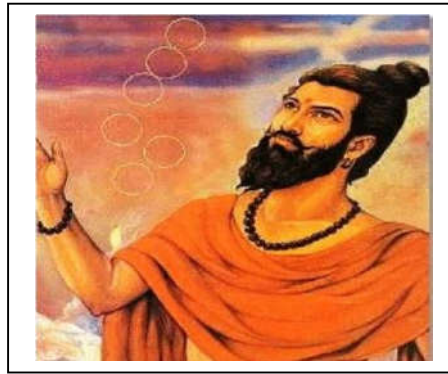
## INTRODUCTION

### Indian Philosophical System

Indian Philosophical System is classified into 3 categories i.e. Brahmana, The Buddhists and The Jains. There are six orthodox schools namely mimasa, Vedanta, sankhya, yoga, vaisesika and nyaya. In this mimasa, sankhya and vaisesika are considered as a nirisvara (godless) schools, they are astika because they accept Vedas as valid epistemology. In every philosophical system, there is an authoritative text bearing the same name as the philosophical system itself and associated with a thinker as the author:

- Jaimini's Mimamsa-sutra
- Badarayana's Vedanta-sutra
- Kapila's Sankhya-sutra
- Patanjli Yoga-sutra
- Kanada's Vaisesika-sutra
- Gautama's Nyaya-sutra

In this paper we will talk about only Kanada's Vaisesika Sutra.



### Acharaya Kanada

Acharaya Kanada was born in 600 BC in Prabhas Kshetra (near Dwaraka) in Gujrat, India. His real name was Kashyap [1]. He was a Hindu sage and philosopher who founded the philosophical school of Vaisheshika and authored the text *Vaiśeṣika Sūtra*. He also wrote a book on his research “Vaisheshik Darshan” and known as “The Father of Atomic Theory”[1].

His primary area of study was Rasavādam, considered to be a type of alchemy. He is said to have believed that all living beings are composed of five elements: water, fire, earth, air, and ether. Vegetables have only water, insects have water and fire, birds have water, fire, earth and air, and humans, the top of the creation, have ether—the sense of discrimination (time, space, mind) are one.

Kanada came up with the idea that *anu* (atom) was an indestructible particle of matter. An interesting story states that this theory occurred to him while he was walking with food in his hand. As he nibbled at the food in his hand, throwing away the small particles, it occurred to him that he could not divide the food into further parts and thus the idea of a matter which cannot be divided further came into existence. He called that indivisible matter *anu*, i.e. molecule, which was misinterpreted as atom. He also stated that *anu* can have two states — absolute rest and a state of motion [2].

Adherents of the school of philosophy founded by Kanada considered the atom to be indestructible, and hence eternal. They believed atoms to be minute objects invisible to the naked eye which come into being and vanish in an instant. Vaisheshikas further held that atoms of same substance combined with each other to produce *dvyanuka* (diatomic molecules) and *tryanuka* (triatomic molecules). Kanada also put forward the idea that atoms could be combined in various ways to produce chemical changes in presence of other factors such as heat. He gave blackening of earthen pot and ripening of fruit as examples of this phenomenon.

### Vaisesika Sutra

Vaisesika Sutra is pre-Buddhist and was written in between approx 600 BC to 200 BC [3]. The Vaisesika sutra proclaims the futility of life in the temporary world (*maya*) and proposes that an understanding of god can free an individual from Karma, following which liberation will ensue. Major ideas contained in the Vaisheshika Sutra are:

- There are 9 classes of realities: 4 classes of atoms (earth, water, light and air), space (*akasha*), time (*kāla*), direction (*dik*), infinity of souls (*Atman*), mind (*manas*).
- Every object of creation is made of atoms known as *parmanu* which in turn connect with each other to form molecules i.e. *anu*.
- Individual souls are eternal and pervade material body for a time. He also explain the characteristics of Aatma (soul).
- There are 7 categories (*padārtha*) of experience — substance, quality, activity, generality, particularity, inherence and non-existence.

Several traits of substances (dravya) are given as colour, taste, smell, touch, number, size, the separate, coupling and uncoupling, priority and posterity, comprehension, pleasure and pain, attraction and revulsion, and wishes.

Vaisesika Sutras contain 373 verses (slokas) divided into 10 chapters with 2 anvikas (sections) [3] [4]

- In the first chapter Kanada defines those which possess genus (jāti), while in the second āhnikā genus or generality itself and particularity are discussed.
- 2<sup>nd</sup> chapter contains discussions on **substance**. First āhnikā describes the characteristics of the five elements and the second āhnikā establishes the existence of space and time.
- In 3<sup>rd</sup> chapter soul and the internal sense are defined.
- In the 4<sup>th</sup> chapter the body and its adjuncts are explained.
- In the 5<sup>th</sup> chapter action connected with the body and action connected with the mind are investigated.
- In the 6<sup>th</sup> chapter merit (puṇya) and demerit (pāpa) are examined as described in the Sruti.

The first āhnikā discusses the merit of giving, receiving gifts etc. and the second elucidates the duties of the four periods of religious life.

- In the 7<sup>th</sup> chapter qualities of two kinds, those independent of thought and those dependent on it are discussed.
- In the 8<sup>th</sup> chapter indeterminate and determinate perception, and the means of proof are examined.
- In the 9<sup>th</sup> chapter characteristics of intellect are made clear.
- In the 10<sup>th</sup> chapter the different kinds of inference are established.

Vaisesika Sutras are a blend of science, philosophy and religion. He opens many concepts of science with the help of Vedas. He also believed that all living beings are composed of five elements i.e. water, fire, Earth, Air, Ether.

Acharaya Kanada theorized that *Gurutva* (Sanskrit word for Gravity) was responsible for the falling of objects on Earth this below verse proves this: Vaisesika Sutra Fifth Chapter, 1<sup>st</sup> Ahnika slok 7

**संयोगाभावे गुरुत्वत पतनं ||5.1.7||**

### **Samyogabhava gurutvat patanam**

In the non-presence of contact (the pestle) falls due to its heaviness Vaisesika Sutra Fifth Chapter, 2<sup>nd</sup> Ahnika

**अपाम संयोगाभावे गुरुत्वात् पतनम् ||5.2.3||**

Apam samyogabhava gurutvat patanam Waterfalls due to absence of contact and due (the presence) its heaviness.

Acharaya Kanad used some words in their literature which are also used by some foreigner scientists in English but the meanings are same (refer table 1).

| <b>Some important words used in Vaisesika Sutra by Kanad</b> | <b>Meaning[3]</b>  |
|--|--|
| Dravya   | Substance  |
| Guna   | Attribute  |
| Karma  | Action   |
| Samanya  | General  |
| Visesa   | Particular   |
| Samavaya   | Inherence  |
| Prthvi   | Earth  |
| Apa  | Water  |
| Teja   | Energy, fire   |
| Vayu   | Air  |
| Akasa  | Ether, Sky   |
| Kala   | Time   |
| Dik  | Direction  |
| Atma   | Self   |
| Mana   | Mind   |
| Ca (also)  | Motion   |
| Karmatva   | Actionness   |
| Gunatva  | Qualityness  |
| Kriya  | Action   |
| Nitya  | Eternal, regular, lasting  |
| Nityatva   | Eternity, eternal nature   |
|  | Uterine(mammals and born of eggs)  |
| Ayonija  | Non-uterine (first creatures, of the first men and born off the body e.g. of sweat ) |

|            |                          |
|------------|--------------------------|
| Anutva     | Atomicity                |
| Mahattva   | Magnitude                |
| Ekatva     | Similarity, Unity        |
| Prathaktva | Duality, Distinctiveness |

**Table 1: Words used in Vaisheshika Sutra and their meanings Laws of Motion First Law of Motion**

Vaisesika Sutra First Chapter, 1<sup>st</sup> Ahnika (section) slok 20th

**संयोगविभगावेगानं कर्म समानम ||1.1.20||**

*samyogavibhagaveganam karma samanam*

|         |   |  |
|---------|---|--|
| Samyoga | - | Conjunction [5]  |
| Vibhaga | - | Disjunction/separation [5]   |
| Veghaa  | - | impulse creating action  |
| Karma   | - | the force produced by a person's actions in one life that influences what happens to them in future lives[6] |
| Samanam | - | similar/uniform [5]  |

Karma is the common cause of conjunction, disjunction and motion i.e. force is a push or a pull. Now come on the next sloka which is interconnected with previous one

**न द्रव्यानां कर्म [1.1.21]**

*na dravyanam karma.*

|        |   |              |
|--------|---|--------------|
| na     | - | no[5]        |
| dravya | - | substance[5] |
| karma  | - | force        |

Karma is not (a cause) of dravya. It means that force is external not by the body itself [7]. Go back to the 16th sloka of the chapter 1 to explain further the extension of the same definition.

**द्रव्यश्रय्यगुणावां संयोगविभागेस्वकारणमनपेक्ष इति गुणलक्षणम [1.1.16]**

*dravyashrayyagunavaan samyogavibhagesvakaranamanapeksa iti gunalakshanam*

|                |   |                           |
|----------------|---|---------------------------|
| Dravyashrayee  | - | in the body               |
| Gunavaan       | - | attributes                |
| Samyoga        | - | conjunction               |
| Vibhaga        | - | disjunction               |
| Akaraanam      | - | not the reason            |
| guna lakshanam | - | characters of attributes. |

Residing in *dravya*, not possessing *guna*, and (when independent) not being a cause of contact or disjunction are the features of *guna* i.e. conjunctions and disjunctions being caused by force, and that force is not the body itself. The body only possesses its own qualities.

After combining all the terminology we can say that according to Acharaya Kanada an object at rest tends to stay at rest and object in motion tends to stay in motion with the same speed and in the same direction unless acted by an unbalanced force.

Now go through the first research paper presented by Sir Isaac Newton "Principia Mathematica Philosophiae Naturalis" in 1686. His first law also states that every object will remain at rest or in uniform motion in a straight line unless compelled to change its state by the action of an external force. This is normally taken as the definition of inertia [8].

It clearly shows that Indian philosopher Acharaya Kanada had given Vaisheshika Sutra in 600 BC which describes relation between force and motion whereas Newton gave laws of motion in 1686 approximately 2500 years after Vaisheshika Sutra. It means Newton law are not new for the World it exists in Indian literature only.

**2<sup>nd</sup> Law of Motion**

For this law we mainly focus some of the slokas given by Acharaya Kanada in Vaisheshika Sutra. He also gives relationship between nodana (impulse) and effort.

### नोदनविसेसभावानोर्ध्वं न तिर्यग्गमनं [5.1.8]

nodanavisesabhavannordhavam na tiryaggamanam [5.1.8]

nodan - impulse [5]

In the absence of a particular impulse the upward and sideward movement is not possible or we can also say that the projectile can't move upwards unless there is an impulse created [7].

Here Acharaya Kanada gave the concept of impulse (impulse= change in momentum) as nodana.

### प्रयत्नविशेषातनोदनविशेषः [5.1.9]

prayatna visheshaat nodana vishesha [5.1.9]

prayatna - effort [5]

nodan - impulse

vishesha - change in momentum [7]

From particular effort results particular impulse (change of momentum). Here effort is referred as Force x time because Kanada is talking about change in momentum.

### नोदन विशेषात् उदासन विशेषः [5.1.10]

nodana visheshaath udaasana vishesha [5.1.10]

nodana - impulse

udaasana - throwing up/rising [5]

From that particular impulse results the particular jumping (rising/throwing upwards) or a particular momentum reduces a particular rise of projectile. On combining these three sloka (5.1.8, 5.1.9, 5.1.10) we found that Force (F) x time (t) is known as impulse and mass (m) x change in velocity ( $\Delta v$ ) is known as change in momentum.

**Impulse = Change in momentum [9]**

Then equation must be like this

$$F \times t = m \times \Delta v$$

$$F = m \times \Delta v / t$$

We know that,  $\Delta v / t =$  acceleration (a) [10]

Then,  $F = m \times a$

Hence we can say that change of momentum is proportional to the force applied or force is equal to the product of mass and acceleration [11]. Now come on to the Newton's second law of motion which says that the change of motion is proportional to the motive force impressed, and is made in the direction of the right line in which that force is impressed [12]. Again this also proves that Newton can't give anything new to physics he copied the same thing from Acharaya Kanada's literature.

### 3<sup>rd</sup> Law of Motion

Vaisesika Sutra First Chapter, 1st Ahnika (section) slok 21

### कार्यविरोधि कर्म [1.1.14]

*karyavirodhi karma*

karya - action [5][13]

virodhi - opposite [5]/against[13]

karma - action [5] (here it is reaction)

Action (karya) is opposed by karma (action). It clearly shows that every action there is equal and opposite reaction. Kanada first introduced the world about atoms and molecules. He said that every object of creation is made of atoms which in turn connect with each other to form molecules. He also found that universe is made up of "kana" which means

Atoms. He studied atomic theory and found the way atoms move and react with each other. He wrote a book on his research

“Vaisheshik Darshan”. Acharaya Kanada was considered as a Father of Atomic theory [1][14][15][16]. In 1803, during a lecture at the Royal Institution in London, John Dalton (1766-1844) an English chemist gave his first public account of the atomic theory. He proposed that atoms of different elements could be distinguished by differences in their weights. His theory was based on ideas that All matter is composed of atoms cannot be made or destroyed and all atoms of the same element are identical. He was also able to detect that different elements have different types of atoms and chemical reactions occur when atoms are rearranged. In modern times, John Dalton has been credited as the inventor of the atomic theory [16]. This atomic theory concept is open in our next upcoming paper.

## Conclusion

Acharaya Kanada originally known by the name of Kashyap and is believed to have been either born in around 600 BC in Prabhas Kshetra near Dwarika in Gujarat. He was the son of philosopher named Ulka. He wrote a book Vaiśeṣika Sūtra. The school founded by Kanada is Vaisheshika school of Hindu philosophy. This school is attempted to explain the creation and existence of the universe by proposing an atomistic theory, applying logic and realism, and is among one of the earliest known systematic realist ontology in human history. Kanada suggested that everything can be subdivided, but this subdivision cannot go on forever, and there must be smallest entities (*parmanu*) that cannot be divided, that are eternal, that aggregate in different ways to yield complex substances and bodies with unique identity, a process that involves heat, and this is the basis for all material existence. He used these ideas with the concept of Atman (soul, Self) to develop a non-theistic means to moksha. Kanada's ideas were influential on other schools of Hinduism, and over its history became closely associated with the Nyaya school of Hindu philosophy. One of the 18 Puranas, Brahmavaivarta Purana mentions Acharya Kanad -

शिवः कणादमुनये गौतमाय ददौमुने। सूर्यञ्च याज्ञवल्क्याय तथा कात्यायनाय च॥  
पेशः पाणिनये चैव भरद्वाजाय धीमते। ददौ षाकटायनाय सुतले बलिसंसदि॥ (ब्र.वै.प्रकृति 457,58)  
एतसिमन्न्तरे ब्रह्मन्ब्राह्मणा ऽश्टमानसाः। आजग्मुः ससिमताः सर्वे ज्वलन्तो ब्रह्मतेजसा॥  
अंगिराञ्च प्रचेताञ्च ऋतुञ्च भृगुरेव च। पुलहञ्च पुलस्त्यञ्च मरीचिञ्चात्रिरेव च॥  
सनकञ्च सनन्दञ्च तृतीयञ्च सनातनः। सनत्कुमारो भगवान्साक्षान्नारायणात्मकः॥  
कपिलञ्चासुरिञ्चैव वीदुः पंचषिखस्तथा। दुर्वासाः कष्यपो-गस्त्यौ गौतमः कण्व एव च॥  
और्वः कात्यायनञ्चैव कणादः पाणिनिस्तथा। मार्कण्डेयो लोमशञ्च वसिष्ठो भगवान्स्वयम॥  
(ब्र.वै.गणपति 2311-15)

The first two slokas (457,458) said about Kanada, Gautama and other contemporary sages at that time. Other 5 slokas (2311-2315) which were enumerated the names of 28 sages also named Kanada. These are the sages who have existing scientific research on the various subjects were scientists of that era.

In Vaiśeṣika Sūtra he gave the concept of modern physics and chemistry. Law of Motions is texted by Acharaya Kanad but unfortunately we only know about Newton as the “Father of law of motions”. The truth is that before Newton Acharaya Kanad formulated the Laws of Motion.

On the behalf of literature cited and this paper, we conclude that Acharaya Kanada was the first who constitute the laws of motion in his literature Vaisheshika sutra with the help of Vedas. Newton gives all the law of motion after Acharaya Kanad. This paper also shows all the evidences in favour of Acharaya Kanad that he was the true originator of all the 3 Laws of Motion.

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