

ATOM FROM VEDA TO DATE

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The 'good earth' today is at the brink of major catastrophe, thanks to the non-catholic and non-scientific approach of its present day rulers. Religion and science have a great mission if our little planet is to be saved for posterity.

It has become a tradition to believe that science originated in the Greek confederation. Not only this, they take Dalton as the pioneer. The great Indian sages working scientifically and logically awakened their *rtambhara prajñā* (purest intellect), not only to propound the philosophy about the self, but also to prescribe the proper technology to achieve the desired aim. In this pursuit, they did not ignore the study of the world of outside, but their enquiries were confined to the fields which helped them to understand self.¹

The Vaiśeṣika system was essentially a school of atomistic theory. Kaṇāda is associated with the atomic theory. The smallest state of matter is *paramāṇu* (atom) and the largest state is called '*mahat*' (self sense). So he considered atom to be indivisible, a point source, without magnitude, a concept nearer the Boyles' concept. It has potentialities which come into play when it is combined with others. Before becoming manifest in the form of matter, atoms make primary combinations to make diads and triads.

Caraka² postulated that atom is the smallest particle of matter and air and action (energy) are responsible for the combination and separation of atoms.

*Aṣṭāṅga Śarīra*³ believes that active air is responsible for the combination and separation of atoms. On breaking the matter it goes on breaking into smaller particles until we reach a point where further sub-division is not possible. Such state is known as the atomic state⁴. *Nyāya*⁵ believes that the atoms of earth, water, fire and air are different from one another. They are spherical in nature⁶. Since they have a shape⁷, they can combine with other atoms around⁸ them.

Dalton's atomic theory states that matter consists ultimately of indivisible, discrete particles (atoms), and the atoms of the same element are identical. Chemical action takes place as a result of attractions between these atoms, which combine in simple proportions.

Vaiśeṣika takes atom as the cause, but Vyās⁹ considers atoms to be action and as such believes that they can be further sub-divided, a concept which is much nearer the modern concept of atom.

Some Buddhist¹⁰ thinkers conceive of atom as the minutest particle capable of occupying space (Van der Waal's concept). According to them it also remains for the minutest duration of time, coming into being and vanishing almost in an instant only to be succeeded by another atom caused by the first. This concept resembles Planck's quantum theory.

Buddhists and Ajivikas¹¹ believe that in normal condition, no atom exists by itself; rather they exist in a variety of combinations (*saṃghāta* or *kalāpa*). Every unit of combination contains one atom of all the four types of elements (they do not take *ākāśa* as an element) and obtains its character from the predominance of an elemental character. This accounts for the fact that matter shows characteristics of more than one element. Thus, wax may melt and also burn, because it is a *saṃghāta* of elements of water and fire. The elements cohere in a *saṃghāta* by virtue of the atoms of water acting as an adhesive.

According to Jain¹¹ concept of *pudgal* (matter) many atoms combine together to make a *skanda* (compound) which is matter joined together. The attributes of each atom when combined together go to make the attributes of the compound. These *pudgal* (atoms) are called *skanda* (compound) as long as they are held together by their binding power. The composition and the distribution of these *skandas* depend on their binding power and power of differentiation (*bheda śakti*) which are of six types, viz. gross, grosser, very gross, subtle, subtler and very subtle. These atoms are perennial, but still they can be created and consumed.

Very gross (*ati sthūla*)—Those substances that do not recombine by themselves after separation, e.g. wood, stone.

Gross (*sthūla*)—Those substances that recombine after separation, e.g. water, milk, oil, etc.

Gross-subtle (*sthūla-sūkṣma*)—Those that appear to be gross but cannot be held, e.g. shadow, darkness.

Subtle-subtle (*sūkṣma-sūkṣma*)—Those which are subtle but appear to be gross, e.g. taste, smell, touch, etc.

Subtle (*sūkṣma*)—Those that cannot be felt by the body, e.g. *karma*.

Very subtle (*ati sūkṣma*)—Those that are smaller than *karma* vary minute aggregate (*duṣṅuk skandha*).

The Greek philosopher Democritus developed a concept of atom which was later revised by Dalton in 1803 to account for the observation that elements combine in certain definite proportions by weight. The Daltonian atom was very much different from the version of Democritus, but essentially the same as that developed by Kaṇāda in India in 600 B.C. From the writings of the first European Greek Hesiod about the evolution of earth, it appears that even in the ninth century B.C. Greek thoughts were very much in line with those in India.

Wicken¹² writes that "The science never got any final answer for what matter is" but proceeds through a tension of empirical facts and theoretical concept to progressively more powerful and general ways of explaining its behaviour." An answer to all these questions was given by the Vedas long back.

Life, Matter and Universe

In recent years scientists of many disciplines have devoted considerable attention to the study of the relation of life with matter (see ref. 1-3). Virtually all these studies are based on the assumption that life is a manifestation of matter. These scientists postulated a primordial chemical soup of small and simple molecules and they imagined that in the course of time under the influence of chance and mechanical laws, life generated itself from the atoms and molecules.

Copernicus, Galileo, Kepler and Newton were pioneers in the study of gross material phenomena, such as planetary motions. Among the more enthusiastic ones, the French scientist Pierre de Laplace believed that the universe was made of atomic particles. He claimed that for a given position and velocity of these particles, he could at least in principle calculate the entire past and future of the universe. To understand all the natural phenomena and the relationships existing between life, matter and universe, a scientist should involve himself in nothing but a study of the simple pushes and pulls between particles. One might well wonder whether mere pushes and pulls can be solely responsible for all the diverse aspects of the world and ourselves that we experience in life.

Atomic Structure

The Vedic seers tried to symbolise the various attributes of matter in terms of individuals, e.g. heat, energy and radiations represented by *Agni*, light by *Sūrya*, lightning by *Apsarā*, electricity by *Indra*, etc. *Śatapatha*¹³ *Suśruta*¹⁴, *Taittirīya*¹⁵ and other treatise^{16, 17} visualised the whole world as composed of two basic elements, viz. *Agni* and *Soma*. These were represented by different names as the two *Aśvins*. *Mitra* and *Varuṇa*, *Ravi* and *Piāṇa*, *Brahma* and *Kṣatra*, the horses of *Indra* and *Aditi*. This thought became so much prevalent in ancient India that it was mentioned in later Sanskrit books of sectarian^{18, 22} type.

The attributes of *Aśvins*²³ which pervade everything are given as *rasa* and *jyoti* which are again identical with *Agni* and *Soma*. They are described as *citra* (possess-

ing different and opposite characters), *sākhya* (friends of having attraction for each other) and ultimate elements of the world. Similarly, Mitra and Varuṇa^{25,30} Brahma and Kṣatra³¹, Rayi and Prāṇa^{32,33}, are identical with *Soma* and *Agni*. Aditi^{34,35} is identical with matter and its two-fold character suggests that it is composed of only two basic elements. *Soma* has come out of *Aditi*³⁶ (matter).

The dual character of matter³⁷ in later times assumed the character of good or evil. day and night and was symbolised by sun and moon which in their turn are again *Agni* and *Soma*. *Agni* and *Soma* are related to the two horses of Indra^{38,39} and their power. Electricity is identified with Indra^{40,41}. Nighunṭa⁴² has given *vidyut* (electricity), thunderbolt, *pāṇi* and *kuliśa* as the names of *Indra*'s weapons which are all identical with electricity.

It is apparent from the above that the two basic elements of matter are the two types of electrical charges^{43,45} which are opposite in character, but attract each other.

R̥g Veda⁴⁶ uses *pariyaman* (going round according to Sāyana) for Indra, which means that the charge in moving around in space⁴⁷ like planets and sun. Words like *saṃyujā* and *saṅkvyujā*^{48,50} (well joined and joined together) indicate that it refers to modern proton cemented to the nucleus. Mitra and Varuṇa and Aśvins are related to north and south.

Atharva Veda^{51,53} states that *Agni* is related to north (positive) and *Soma* to south (negative). North^{54,56} is magnetic, warm, positive and masculine. It attracts electricity from south. South is electrical, cold, negative and feminine. External is negative and internal is positive. South is most negative, but north is most positive. The unit of positive electricity^{57,58} is more massive than the unit of negative electricity. Rudra is the god of electricity. It is known as the father of *maricis*, which are also known as *maruts*. They are known to be electrical in nature and produce magnetic field in the north-east direction^{59,61}.

All that has been said can be summarized as follows:

1. The ultimate particle of matter is composed of two basic elements.
2. Each of these elements is electrical in nature.
3. The two types of electricity have opposite character, but they attract each other.
4. Electricity is positive and negative.
5. The unit of negative electricity is much lighter than the unit of positive electricity.
6. The lighter negative charge goes around the positive charge like planets or the solar system.
7. The negative charge produces magnetism when going around the positive charge.

It is clear from the above presentation that thinkers in India as far back as the Vedic era had gained clear insight into such complex problems as the nature and structure of matter, atomic structures and relationship between life and matter. The hypotheses propounded by sages of Vedic, Buddhist and Jain periods regarding elements, atomic structure, energy and related aspects are seen to align closely with those put forth in western countries by various thinkers of modern times.

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