

SOME EVIDENCES OF KNOWLEDGE OF SCIENCE AND TECHNOLOGY IN ANCIENT INDIA

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The history and culture of Indian society has ample evidence to believe and corroborate that Indian society had a very rich knowledge of science and technology in the ancient times. The application of scientific knowledge had revolutionised almost all aspects of human life and development be it agriculture, health, maths, environment, biology, chemistry, weather, geology, etc. The four "Vedas" are perhaps the oldest written record of deep scientific and technological knowledge on that was being practiced and applied in daily life in India even thousands of years ago. These have sufficient convincing evidence to believe in the rich heritage of scientific and technological knowledge which was not only in use in the past but also form the basis of the modern day science such as the concept of aeroplanes even unmanned aeroplanes. This paper intends to present a cursory review of the ancient literature with a view to share a bit of the scientific and technology knowledge of ancient times with those working for the development and promotion of science.

Keywords: Science and technology, Ancient Indian literature, Vedas, Evidences

Introduction

The history of medications is as old as the human beings themselves. The advent of science and technology is not at random rather it is based on the treasure of knowledge, experience and researches through the ages. However, the last two centuries have witnessed tremendous progress in the area of research, innovation, development and application of scientific and technological knowledge which have revolutionised almost all aspects of human life. In the present age, the most of the development of science and technology is taking place in the so called modern world or western countries. However, efforts are being put on in several other countries to improve the quality of human life by way of innovations in the field of science and technology. The countries are graded as 'developed',

'developing' and 'underdeveloped' nations based on the advancement and application of scientific and technological knowledge.

The Indian continent is considered cradle of development of the oldest civilisation in the world. The remains and signs of 'Indus Valley Civilisation', and 'Harappan Culture' have indicated that the people in ancient India had deep knowledge of scientific and technology and their application. However, it appears that the form of application of scientific and technological knowledge was different from the present-day forms of science and technology. Even the pace of development of science and technology has not been as fast as it is seen in the recent times. The ancient Indian thinkers have made a great contribution to the knowledge Mathematics by giving the concept of 'Zero' and 'Pi'. The Indian Knowledge of '*Ayurveda*' – the traditional Indian system of treatment of diseases which is based

on the use of plant parts and products in health science is a unique contribution to the world.

Methods and Procedure

For the development of this paper, some relevant literature was surveyed which included books, research articles and research studies from the web resources. The literature was thoroughly screened to make notes to substantiate and underpin the idea that the ancient Indian Literature has sufficient evidence of rich scientific and technology and its application.

Result and Discussion

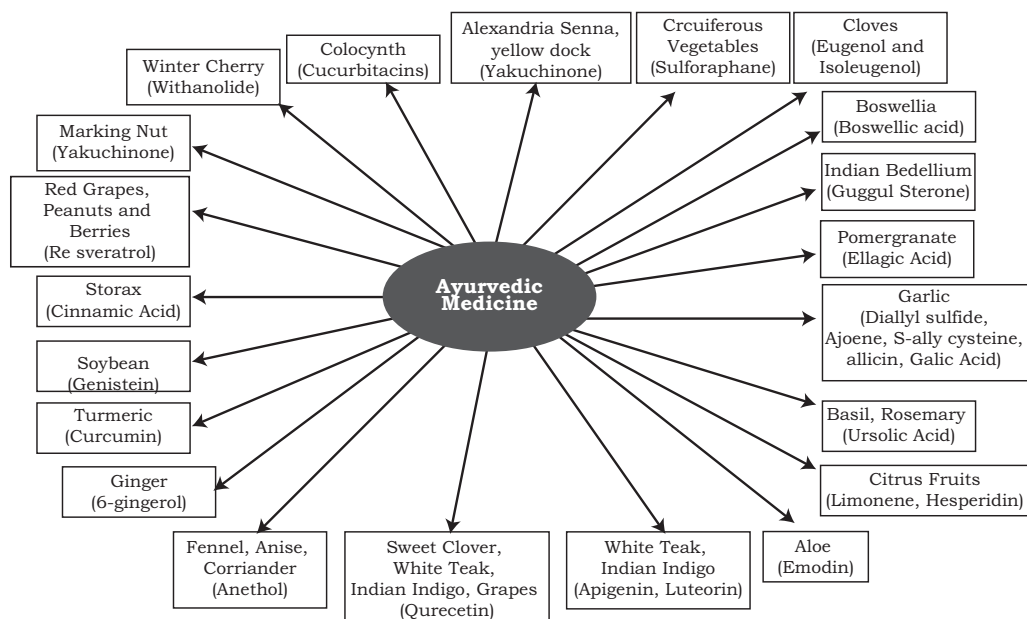
Science in Vedic Literature: D. Ojha (2005) in his book '*Vigyan Aur Ved*', has cited the Vedic literature as evidences of rich knowledge of Agriculture, Mathematics, Scientific nature of Fire, Air and its Mechanical application, the science of sound, chemistry, botany, geology, weather science, environmental management, scientific nature of 'Yagya', Water and Scientific Attitude, etc.

Similarly, the booklet by Swami Vivekanand Saraswati (2016) entitled '*Vigyan Ki Drishti Mein Agnihotri Yagya*' speaks about several researches about performing Yagya, carried in India and other countries including Germany and America. The booklet has quoted the relevant hymns from *Vedas* and research experiments carried out by India and abroad about the importance and positive impacts of performing 'Yagya' —the Hawan on the healthy growth of 'Flora and Fauna', purification of air, and even causing rainfall. 'Ashes' from the 'Yagya' are found to have pesticidal effect, and increase the soil fertility.

A plethora of ancient literature and articles

are available as a strong evidence to suggest that the history of Indian science and technology has been very exciting and pace setting for the modern science and technology. This may be due to the fact that the old Indian literature, particularly the sanskrit literature, was destroyed by the invaders in the past. The Nalanda and Takshshila have been the prominent seats and authority in spreading education and knowledge to the world. The age of Vedas (The Vedic period) has been the golden period in the history of all round knowledge including the development and application of science and technology. The Vedic literature has sufficient evidences to convince even the modern world that the knowledge and practice of science in this period of Indian history has been at its best. One of best evidences is the development and practice '*Ayurveda*' for curing all the diseases and ailments of human beings and it has very little or no side effect at all. This is now one of the established practices (pathy) of curing the diseases which is entirely based on the products and parts of plants and herbs. The present repository of '*Ayurveda*' is obviously a result of sustained scientific analysis and testing of the plant parts and products for their medicinal importance. The *Charak Samhita* and *Sushrut Samhita* are the fool proof documents of surgery and Ayurvedic medicines.

Attempts have been made by the researchers (Aggarwal *et.al.*, 2006) to see the application aspects of traditional Ayurvedic medicines to suppress the inflammation and cancer. Aggarwal has also mentioned that paper, cement, perfumes, ink, soap, glass, liquors etc., were prepared and used in India even before Christ.



Source: Dr. I. Suryanarayan's (2013) Citation

Chemistry in Ancient Indian Literature: The ancient literature is abundant to indicate that Indian people in the past had discovered the various metals and elements and even the concept of 'Atom' (parmanu) was given by of the saint (Rishi) Kanad, around 2500 B.C..

In the recent times, some people have made attempts to survey and compile the scientific information from the ancient literature. Some of these references are available even on the web pages, which include the following;

D. Iragavarapu Suryanarayana (2013), cited some examples of Ancient Indian chemistry. He also mentioned that S. Radhakrishnan, in his book on Indian Philosophy Vol.2, (1930), has discussed the philosophical aspects of *Vaisheshika Darshan* and he also discussed atomic theory and its universality. He also mentioned that '*Charak Samhita*' - the

medicinal treatise- discusses about 150 types of diseases, 341 medicinal plants, 177 medicinal substances of animal origin and 64 medicinal substances from mineral origin. The *Sushruta*— the father of surgery, the great surgeon of that time, developed a number of instruments for operations of human being. He further, mentioned that Kautilya's *Arthashastra* had described the mines, occurrence, nature, purification methods of metals and also the gems, rubys, pearls. The *Arthashastra* also described the properties and qualities of gold and silver. And that the increase in copper content in the gold increases its redness and the mixing of lead (Pb) increases brittleness of the gold.

Professor Prafulla Chandra Ray has worked extensively in establishing Chemistry in India. He has also translated *Rasa Shastra* from Sanskrit to English in 1919, so that

world, particularly Western world, know the contribution of Ancient Indians to Chemistry. He also authored a book "The Hindu Chemistry".

The other ancient literature on Chemistry include in the following books; *Rasa Ratnakar*, *Rasanava* and *Rasendra Mangalam* all by Nagarjuna; *Rasapraksa sudhakara* by Yasodhara; *Rasa Ratnakara* by Nitayanatha; *Rasa Chintamani* by Mahashweta Devi; *Rasendrachudamani* by Somveda; *Rasaratna Samucchayam* by Vegabhata; *Rasa Rajalaxmi* by Vishnu Deva; *Dhatuveda* and *Sarveswara Rasayan— Budhist Tantra*, etc.

The ancient Indian civilisations had excellent knowledge of extracting the metals and alloying of metals. For example, the non-rusting iron pillar near the Qutub Minar in New Delhi is an excellent evidence of alloying in the past. The ancient people had sound knowledge for preparation and use of natural dyes.

Conclusion

The paper tries to present a cursory review of the ancient literature to highlight evidences of the knowledge of science and technology around 4000 years ago in India. The *Bhaskaracharya*, *Nagarjuna*, *Kautilya*, and many philosophers of Vedic period have produced a very rich literature on science and technology. The literature also suggests that the development of science and technology has been commendable and pace setting in various fields, including metallurgy, ayurveda, physics, biology, space science, agriculture, in the Indian continent. However, it could not sustain due the invasions and destruction of literature by the invaders. On the basis of foregoing discussion, it could be inferred that had there been sustained efforts for the development of scientific work, the country would have been the leader of the world in the field of science and technology.

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