

# Knowledge and Women

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## Abstract

Since ancient times, women have been held at an esteemed position in terms of knowledge. This paper tries to address the role of women who have raised the scientific levels to great heights both from the Western and Indian Perspective. From the western viewpoint, there has been evidences of Greeks and Romans worshipping Goddess Athena and Minerva, respectively. On a similar note, Indians have regarded Goddess Saraswati as the mother of knowledge and wisdom. The intellectual calibre of Indian women has been explicitly stated in the epics and puranas. For example, there is a mention in Mahabharata indicating the managerial capabilities of Draupadi. These characters, albeit mythological portray the essence of the limitless capabilities of women.

Starting from the historic times, the western world has seen women professionals. Some of them are Merit-Ptah the first known physician from Ancient Egypt, Agamede the first female healer from Greece, Hypatia first known woman mathematician, Charlotta Frolich first female historian, Marie Curie first woman to win a nobel prize, Laura Bassi first woman to earn a university chair (18th century), Ada Lovelace first woman programmer, Grace Hopper woman who invented first compiler and Mary Anning Paleontologist.

A few remarkable Indians are Avvaiyar, who was one of the greatest poets of all times, Gargi and Maithreyi, who are mentioned in the Upanishad texts, the saint poet Mirabhai, Leelavathi, the mathematician and astrologer, Razia Sultana a monarch, the south asian physicians Kadambini Ganguly and Anandhi Gopal Joshi, the meteorologist Anna Manni, Sarla Takral who was the first woman to fly an aircraft and in the present scenario Dr. Shantha, who is heading the Adayar Cancer Institute.

This paper explores the effort and dedication put forth by the aforementioned personalities with a hope that it will create an inspiration to the present generation female individuals

## 1 Introduction

## 2 Historical Period

### 2.1 Indian Personalities

In Vedic period, three Goddesses namely, Illa, Saraswati and Mahi has been quoted for the purpose of acquiring knowledge as [1]:

“May Bharati come speeding to our sacrifice and Ila hither awakening our consciousness in human wise, and Saraswati, — three goddesses sit on this blissful seat, doing well the Work.” The image of Goddess (Figure 1) portrays a musical instrument called Veena holding in two hands, a book in one hand and a tiny garland in another hand. These represent music, knowledge and inner bliss, respectively.



Figure 1: Goddess Sarawati

The Vedic period has seen intellectuals like Gargi and Maithreyi. Gargi Vachnaknavi, who lived during 700 BC was honored as a great philosopher [2]. The debate between Gargi and Yajnavalkya has been specified in Brihadaranyaka Upanishad, in which Gargi puts forth a series of thought provoking questions to Yajnavalkya. A few such questions from this debate is given below.

*Yajnavalkya , “ said she, “if all this is pervaded by water, by what, pray, is water pervaded?”*  
*“By air, O Gargi.”, replied Yajnavalkya.*  
*“By what, pray, is air pervaded?”*  
*“By the sky, O Gargi.”*  
*“By what is the sky pervaded?”*

These questions clearly indicate scientific thought process of Indian Women.

On a similar front, in the Indian Epic Mahabharatha, there are instances of women empowerment. Draupadi is known to have managed the people and wealth in the palace [3].

In South India, around First or Second Century A.D. there was a Tamil Poet called Avvaiyaar. She can be considered as one of the pioneers in Science also, because she specifies about the information of energy of atom in one of her poems as:

*“aNuvaith thuLaitththu Ez kadalai puguththi”*  
*Energy of seven seas within a pierced atom*

**Lilavati** was the daughter of Bhaskara (during 1150 A.D), who was one of the pioneers in Indian mathematics. The tale goes like this: Lilavati was an intelligent and inquisitive child and Bhaskara had always kept an eye on this nature of hers. However, when Bhaskara analysed her horoscope, he was shocked to see that her marriage will be short-lived. To circumvent this issue, Bhaskara prepared a perfect device that could calculate the auspicious time for her marriage. Lilavati's curiousness drew her close to the device (when her father was not near) and while examining, the pearl that she was wearing fell into the device. The calculations went awry and the auspicious time was missed. Eventually, Lilavati got married, but as feared it was short-lived. Soon after this incidence, Lilavati was extremely upset and was not able to lead her regular normal activities. In order to remove her worries, Bhaskara posed a lot of arithmeic puzzles which made her busy. These questions later on helped her to be the greatest mathematicians of all times [11].

## 2.2 Western Personalities

According to the Greek Mythology, Athena is the embodiment of wisdom and power.

Various poems written for her by Odysseus G. Osborne spot light the depth of powers that the Goddess has.



Figure 2: Goddess Athena

One of the many poems written on Athena in relation to Wisdom as [4]:

*Marshal of Wisdom*  
*give the gift as you resolve,*  
*As a Lance of Glory,*  
*Heralding your puissant strike!*  
*Or like a silent owl*  
*A glide on the Nights wind*  
*With talons wide!*  
*Mighty Athena! Let me be re-born of your thunderbolt!*

Minerva was the Roman Goddess of Wisdom and war. She is believed to be the inventor of numbers and musical instruments. She was later equated with the Greek Goddess of Wisdom, Athena.

She was called as the “goddess of thousand works” by Ovid, a Roman poet. She was being worshipped on the Capitoline Hill along with Jupiter and Juno as the Powerful triad of Gods.

Mythologically According to Homer, Agamede was a Greek physician acquainted with the healing powers of all the plants that grow upon the earth.

Merit-Ptah is believed by Egyptologists to be the first-ever named Physician. She is most notable for being the first woman known by name in the history of the field of medicine, and also the first named woman in all of science as well.

She practiced medicine nearly 5,000 years ago, and was immortalized by her son on her tomb as “the chief physician” [5].



Figure 3: Merit Ptah

Agnodike was the first female Athenian physician, midwife, gynaecologist. She studied in Alexandria under the great Herophilos, the first anatomist.



Figure 4: Agnodike

Maria the Jewess is the first female alchemist and is credited with the invention of several chemical apparatus.

Hypatia was a Greek mathematician, astronomer and philosopher in Egypt. She was the head of Neoplatonic school of Alexandria. Her contributions are considered as invention of the hydrometer used to determine the relative density (or specific gravity) of liquids. She worked collaboratively with her father on many works.

## 3 Modern Period

### 3.1 Scientific women personalities from India

Janaki Ammal Edavaleth Kakkat (4 November 1897 – 7 February 1984) was the botanist whose works are considered to be one of the most important breakthroughs in the research of sugarcane and eggplant. Having born and brought up in Kerala, she pursued school and college education in her home town and Chennai, respectively. She then went to USA to receive the doctorate during 1931. She is considered to be the first woman to obtain a Ph.D in botany from USA. A flower has also been named after her as 'Magnolia Kobus Janaki Ammal' [12].

Aseema Chatterjee (1917 - 2006) was a notable Indian chemist in the area of organic chemistry and phytomedicine. She received M.Sc in the field of Organic Chemistry in 1938 and D.Sc. from the same university in 1944. “She made significant contributions in the field of medicinal chemistry with special reference to alkaloids, coumarins and terpenoids, analytical chemistry, and mechanistic organic chemistry”. [13]

Dr. Anandi Gopal Joshi (1865 - 1887) was the first female to obtain the medicine degree from USA. It was during the time of when Britain ruled India and hence Indians had an awareness of science from the west. As a regular practice those days, children were married at an early age and Anandi was not an exception. Her Husband Gopal Joshi encouraged Anandi to pursue education. She gave birth to a boy while she was fourteen years. But due to the non-availability of medical facilities, the baby could not survive beyond 10 days. This prompted her to pursue medicine and her husband helped her to send to USA for a medical profession. Despite her challenges of poor health, she successfully completed MD in 1886. She returned back to India on 1887 and wanted to open a medical college for women in India. But her health declined and died in 1887 [14].

Shakuntala Devi (1929 - 2013) was the arithmetic prodigy of the century. She is known as the “human computer”, since she could calculate even a 13X13 digit multiplication in 28 seconds. Her father was a working in a circus and had taught her card tricks, which enabled him to discovered the mathematical trait in her. She did not have a formal school education because of financial constraints. However, it does not deter the spirit of Shakuntala Devi to pursue the love for numbers. She travelled across widely to Europe and USA and exhibited her talent. Her calculation approach was appreciated by the scholars worldwide and her multiplication of 13X13 number was recorded in Guinness Book of Records [15].

Anna Mani (1918 - 2001) was a physicist and a meterologist, who made important contributions in meterological instrumentation. She was influenced in her younger days by Gandhian movement and vowed to wear khādi, a typical variety of cloth made by Indians. She initially wanted to pursue medicine, but shifted her career to physics since it appealed her more. She pursued her degree from Presidency college and did research under Sir.C.V. Raman. Since she did not have masters degree, she could not get Ph.D at that time. She then proceeded to Imperial college, London for a degree in meterological studies and then returned back to India. She was the deputy director of Indian Meterological department and authored a number of papers in the area of meterological instrumentation. [16]

Dr. Muthulakshmi Reddy (July 1886 – 22 July 1968) was one of the pioneers in India to be the first in many sectors: “first female student to be admitted into a men’s college, the first woman House Surgeon in the Government Maternity and Ophthalmic Hospital, the first woman legislator in British India, the first Chairperson of the State Social Welfare Advisory Board, the first woman Deputy President of the Legislative Council, and the first Alderwoman of the Madras Corporation Avvai Home” [17]. Despite the pressure of stopping the education citing gender as a reason, Dr. Muthulakshmi stood against odds and completed the degree of medicine from Madras Medical College. She did not stop there, but entered into political career and also was a social reformer. Her proof of success stands today as Adayar Cancer Institute, which she initiated for the benefit of masses. This reform is presently headed out by another female physician namely, Dr.Shantha [18].

### 3.2 Scientific women personalities from the western world

Christine de Pizan is a fifteenth-century writer in France. She is the author of the Book of the City of the Ladies. She was an early feminist who challenged her culture’s stereotypes of women. She wrote love ballads, books supporting and extolling the powers and virtues of women (including a response to Jean de Meun’s Roman de la rose), and a work about Joan of Arc.[6]



Figure 5: Christine de Pizan

Maria Sibylla Merian was a Naturalist, an Entymologist and a Botanical Illustrator. She published collections of engravings of plants in 1675, 1677, and 1680. She collected and observed live insects and created detailed drawings to illustrate insect metamorphosis.[7]

Maria Gaetana Agnes was the first woman to write a mathematics handbook and the first woman appointed as a Mathematics Professor at a university. She is credited with writing the first book discussing both differential and integral calculus and was a member of the faculty at the University of Bologna[8].



Figure 6: Maria Sibylla Merian

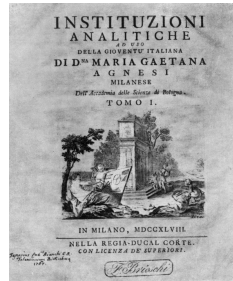


Figure 7: First Page of the Book Agnesi wrote

Laura Bassi was an Italian scientist and the first woman professor to be appointed at a European university[9].



Figure 8: Laura Bassi

Charlotta Frolich became the first of her gender to be published by the Royal Swedish Academy of Sciences with three books in agricultural science depicting her own experiences and suggesting various inventions in agriculture. The only other female to be published by the Academy of Sciences during the age of liberty was Eva Ekeblad[10].

Marie Curie  
Ada Lovelace  
Grace Hopper

## 4 Analysis

The biographies of each of the aforementioned individuals provide the proof of the accomplishment in varied fields. An analysis in terms of the field and the challenges that they faced are provided in Table 4.



Figure 9: Charlotta Frolich

Table 1: Analysis of a few female personalities

S.No	Name	Period	Area of Excellence	Challenges Faced
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Name :  
 Period :  
 Area of Excellence :  
 Challenges faced :

Name :  
 Period :  
 Area of Excellence :  
 Challenges faced :

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Period :  
Area of Excellence :  
Challenges faced :

## 5 Conclusion

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