**Telescope’s unintended consequences: Women and non-European world.**

Women:

What was happening to the 51 percent of humanity?

As late as early 1900s, women were denied membership in prestigious science academies: Marie Curie, two-times noble winner, not admitted to the French Academy of science, Royal Society did not permit women.

Women and Science through the Middle Ages, Renaissance and the period of the SR

The TREND: whatever opened up new horizons for men, closed the existing options for women’s education.

1. Convents and monasteries: For most of the Middle Ages, church was the center of learning and education, for BOTH men and women.

Convents did provide women opportunities to learn and grow intellectually. A number of women became renowned for their learning – poets, healers, musicians: Hildegard von Bingen.

1. Rise of the universities : universities in the 12 th century came at the cost of church institutions In Protestant countries like England, the lands and properties of Catholic churches were taken
2. over by the kings and given to universities (the nunnery of St. Radegund, an important center for women, was taken and given to Jesus College of Cambridge university).

Universities were formally closed to women, until the end of the 19th c and in some cases, until the 20th c.

The only exception was Italy – where for some reason, women were admitted.

* University of Bologna gave honorary professorship to Maria Agnesi in 1748 who had become well-known for her work in mathematics. She is known for her work on cubic curve that is still referred to as the “witch of Agnesi.”
* Laura Bassi became a professor of physics in Bologna university. She was well-known for her work on mechanics.

1. Scientific Academies did not admit women as members though they allowed them to work there.

**Science through Arts:**  art and craft were considered suitably feminine.

We do find women using art as a way to further knowledge.

* Madeleine Basseporte: worked at the Royal Botanical Garden in France where she sketched rare plants grown in the garden from 1735 till her death in 1780.
* Anatomist Marie Biheron (b. 1719), a student of Basseport, made wax models of human bodies based upon dissections. These models were life-like and used in medical schools for training doctors (all males!).
* Maria Eimmart (176-1707) exact sketches of astronomical observations with her astronomer father. Between 1693-8, she made som 250 drawings of phases of the moon in continuous series that laid the foundation of a lunar map. Also drew the total lunar eclipse of 1706.

Women in the Crafts tradition:

Of the various institutional homes of sciences, only the artisanal workshops admitted women. Women have always participated in the crafts needed for everyday living: spinning and weaving, pottery, farming, mid-wifery. As a result, women had full membership in most guilds – they could buy and sell and be represented in the court of law, but they could not hold office.

Astronomy as a crafts’ tradition:

Astronomy started out as a private, family-run enterprise. After Galileo, interested star-gazers would build observatories on their own roof-tops. Women got a chance to learn astronomy and make observations of their own.

The craft tradition was especially strong in Germany where some 14 percent of astronomers were women.

Some important women astronomers of the 17th c include:

* Maria Cunitz (1610-1664): learned many languages and sciences from her father, who was a medical doctor. Married a doctor who did astronomy in his spare time. She is famous for publishing a simplified version of Kepler’s Rudolphine star tables. As people did not believe a woman could do all this, her husband had to write a preface saying that it was actually her work and not his !
* Elisabetha Koopman (later, Hevelius) , 1647-1693) married the famous astronomer, Johannes Hevelius who was 36 yrs her senior as she wanted to continue to do astronomy. Hevelius was a brewer by trade and an astronomer in his spare time. Elisabetha became his chief assistant.

**ohannes Hevelius,**(Latin), German **Johann Hewel**, or **Johann Howelcke**, Polish **Jan Heweliusz** (born Jan. 28, 1611, Gdańsk, Pol.—died Jan. 28, 1687, Gdańsk), astronomer who compiled an atlas of the [Moon](http://www.britannica.com/place/Moon) (Selenographia, published 1647) containing one of the earliest detailed maps of its surface as well as names for many of its features. A few of his names for lunar mountains (e.g., the Alps) are still in use, and a lunar crater is named for him. Hevelius also made a catalog of 1,564 [stars](http://www.britannica.com/topic/star-astronomy), the most comprehensive of its time, and a celestial atlas in which several constellations, now accepted, were shown for the first time. After his death, the catalog and the atlas were published together (Prodromus Astronomiae, 1690) by his wife, Elisabetha, who had collaborated with him in his observations.

* Maria Winkleman (b. 1670) the most famous of all women astronomers of that era. Trained at home, marries Gottfried Kirch, germany’s most famous astronomer who was thirty years her senior. Kirch eventually became the chief astronomer of the Berlin Academy of science and Maria became his chief assistant. They used to take turns watching the sky, or divide up the sky, he watched the north, she the south.

She became famous for observing a comet in 1702. But the credit was given to her husband and the report to the King was sent under his name, but he later acknowledged her priority. She continued to work on producing calenders which were a very lucrative business for the Berlin Academy.

After her husband’s death, she tried to secure the job for herself, for which she was fully qualified. She was denied the job, out of fear that the calender business will fall if people got to know that a woman was producing them. She continued working as an astronomer , along with her son , in another private observatory. Later on, the Berlin Academy hired her son, and brought her back as her son’s assistant.

Telescope goes East …. To china and India

* Earliest transmission of the telescope was to Japan, when a Dutch sea captain brought it to Japan
* The british ambassador Sir Thomas Roe presented a telescope to the Emperor Jahangir in 1615
* Chinese translation of Galileo’s astronomical discoveries became available in China in 1615.

But for at least 100 years before the first telescope arrived in India, spectacles were already quite common in India. The Portugese had introduced eye-glasses and records show that between 1444-1481, eyeglasses from Portugal, Flanders and England were being imported into India. references to use of glasses began to appear in literature and paintings. [called uplochangolak ]. So by the time, Jahangir is presented with the first telescope, Indians already had a century of experience with lenses. (did not lead to any new inventions]

So what was the reception?

it did not lead to any new developments in astronomy.

No one turned it to the sky.

Astronomy in the Mughal empire: had inherited the Ptolemaic model and used the data from the Samarkand observatory dating back to Ulug Beg who died in 1449.

The same old instruments – celestial globes, armillary spheres and astrolabes -- continued to be made and used. The instrument makers did not try to manufacture telescopes. Even the famous Jaipur observatory of Jai Singh(1720s) continued to use pre-telescopic methods of observation, even though jai singh is reported to have owned a telescope.

A “curiosity deficit” existed.

Why: stagnation in education.