

# **A History of Science in Latin America (INTD290): Unit 1.2**

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# **Outline**

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# Outline

*Comparative medical treatments - chapter 1 content.*

## Chapter 2 content

1. Mining and agriculture in Nueva España
2. Construction of scientific communities
3. The formation of scientific literature and community,  
importation of scientific texts
4. Catholic religious orders in Latin America
5. Galileo, Kepler, and the Heliocentric system of the world

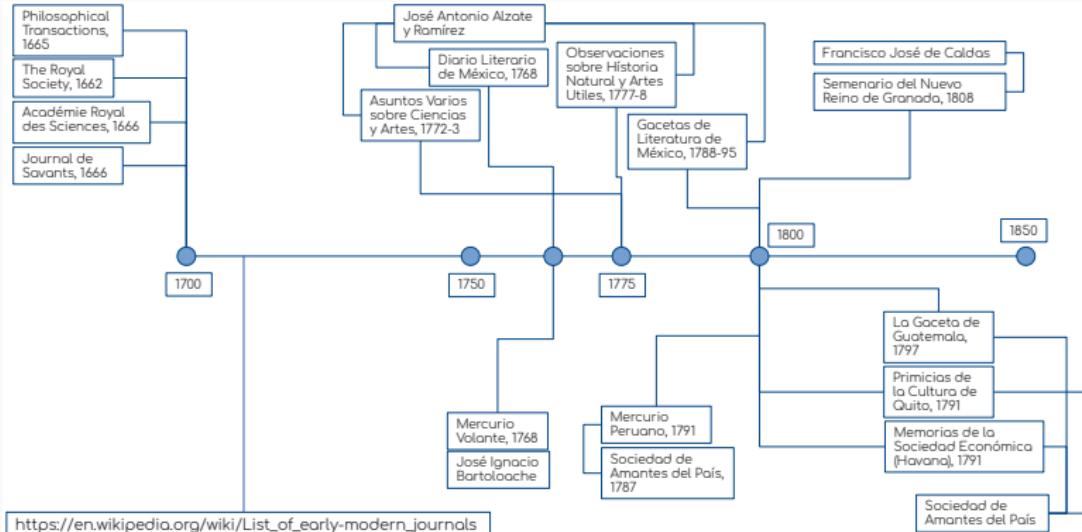
## Activities

1. Timelines of discoveries and development
2. Geographical illustrations with Google Earth
3. Digital Storytelling on cosmic rays and the solar wind

## **More on Literary Societies and Journals**

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# More on Literary Societies and Journals



**Figure 1:** A visualization of scientific journals of the 18th Century Latin American society. Note the prevalence of Societies of Friends of the Country, versus Royal Societies. Note also the gap between 1700-1750. For a complete list of journals in the gap, see the link at lower left.

## More on Literary Societies and Journals

1. Friends of the Country versus Royal Society
2. Alzate, Bartolache (Mexico)
3. Other journals not shown: *Gacetas de Caracas, 1808*, *Semenario de Agricultura, Industria y Comercio, Buenos Aires, 1802*, *O Patriota, 1813-1814*
4. Mining processes debated in these journals, the patio process versus the Born process
  - Fausto de Elhúyar (Spain), Baron von Nordenflicht (Sweden)
  - José Antonio Alzate (New Spain) wrote in *Observaciones* in 1787 that Álvaro Alonso Barba discovered the “Born method” in 1640. The Creoles noted that the Born method was not as efficient in this situation.

## More on Literary Societies and Journals

The results of an intriguing physics experiment were first published in **Gacetas de Literatura**, by José Antonio Alzate y Ramírez, José Francisco Dimas Rangel, and Antonio de León y Gama. An article summarizing their results:

M. P. Ramos-Lara *Contribuciones de astrónomos mexicanos al estudio de auroras boreales de baja latitud entre 1789 y 1791.*  
Revista Mexicana de Física E **18** (1) 156-167

<https://youtu.be/czMh3BnHFHQ>

<https://xkcd.com/2004/>

# More on Literary Societies and Journals

## José Antonio Alzate y Ramírez

1. Catholic priest, and descended from Juana Inéz de La Cruz (protofeminist Catholic nun, writer, intellectual - see the work of Octavio Paz).
2. Meteorology, Physics, Astronomy, Mathematics, Indigenous history
3. Corresponding member of French and Spanish Academies of Science



- Wrote 30 books. One of them: *Observación del paso de Venus por el disco del Sol.* (1770)
- 1885: La Sociedad Científica Antonio Alzate, later became The National Academy of Sciences (Mexico)

# More on Literary Societies and Journals

## Antonio de León y Gama

1. Lawyer who worked at the *Real Audiencia de México*
2. Astronomer, anthropologist, writer, watchmaker
3. Discovered two important anthropological items:
4. (Projects?)



Figure 2: (Top) Leon

- La Coatlicue - An intact statue of the “mother of the Gods,” including Huitzilopochtli.
- La Piedra del Sol - A calendar stone that led to a modern understanding of how the Aztec calendar worked.

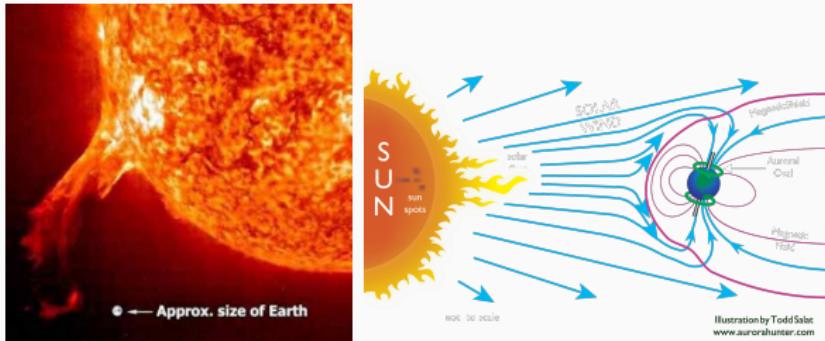
## More on Literary Societies and Journals



**Figure 3:** The colors of the aurora correspond to solar electrons interacting with various gases in the atmosphere.

1. European (French) scientists had established a lower limit on the latitude auroras could be observed: 35 degrees North of the Equator.
2. The Mexican scientists observed the aurora at 16.8 degrees North
3. Like modern scientists, they did not stop at observation but attempted to explain with a theoretical model

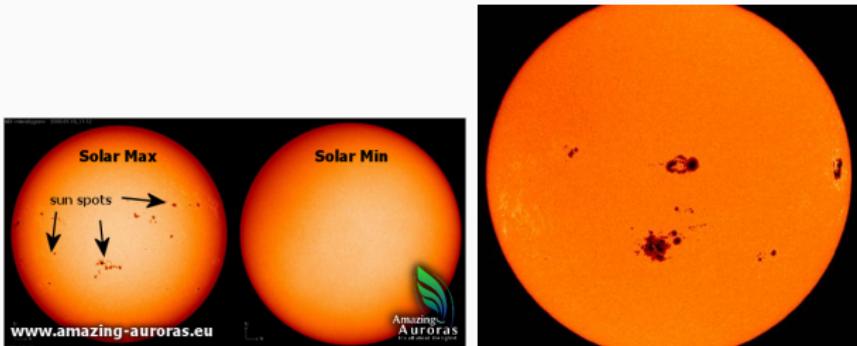
# More on Literary Societies and Journals



**Figure 4:** (Left) The size of a coronal mass ejection is several times larger than Earth. (Right) The solar wind is charged, meaning it has a magnetic field, which adds to that of the Earth.

- Auroras are pretty, but they will kill you in your face
- The three Mexican scientists noted that auroras were correlated with sun spots and provided historical data for future scientists
- Increase in sun spot size, low altitude aurora

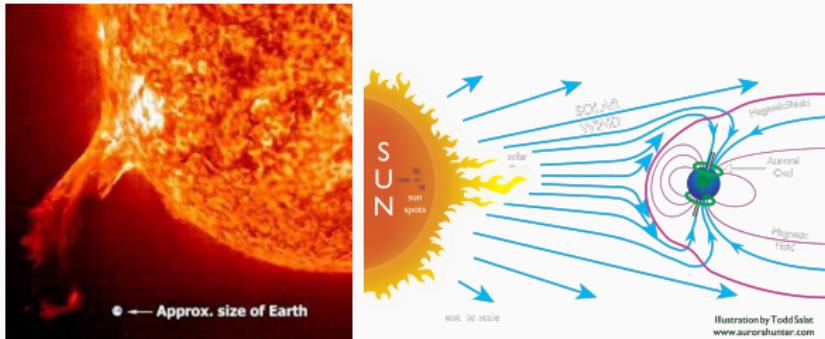
# More on Literary Societies and Journals



**Figure 5:** The colors of the aurora correspond to solar electrons interacting with various gases in the atmosphere.

- Sun spots are concentrations of magnetic field that deflect charged particle conduction
- Cools the area, making it darker
- Sun spots come in pairs (magnetic fields)

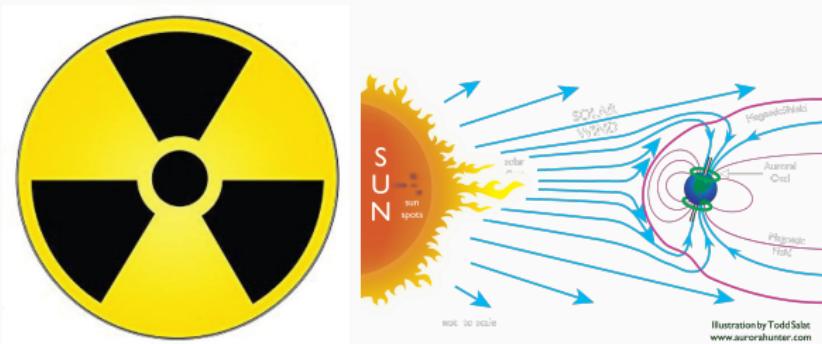
# More on Literary Societies and Journals



**Figure 6:** (Left) The size of a coronal mass ejection is several times larger than Earth. (Right) The solar wind is charged, meaning it has a magnetic field, which adds to that of the Earth.

- The scientists of New Spain deduced the altitude of the aurora phenomenon
- Predicted where they could be observed in other continents, got some of them right

## More on Literary Societies and Journals



**Figure 7:** (Left) The size of a coronal mass ejection is several times larger than Earth. (Right) The solar wind is charged, meaning it has a magnetic field, which adds to that of the Earth.

- They formulated a theory of how the light was produced, and designed an apparatus
- Using the apparatus, **they reproduced some aurora properties in the lab.**

## More on Literary Societies and Journals

Noteworthy for the history of science:

*De tres modelos originales de auroras boreales formulados en el continente americano hasta el siglo XVIII, dos de ellos fueron planteados en Nueva España y uno en Estados Unidos de Norteamérica [5].*

(Citing from paper above). The results generated books, articles, and in particular, articles published in the journal founded by Alzate: *Gacetas de Literatura*.

**Review graphs from paper.**

## **Colleges and Curricula**

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## Colleges and Curricula