



### LESSON 7:

## Ingenious: Franklin Assembles a Scientific Community

### OVERVIEW

There are many memorable images associated with scientific progress, such as Isaac Newton sitting under an apple tree or Franklin flying a kite in a thunderstorm. These images lead us to believe that many, if not most, of our scientific accomplishments can be attributed to the efforts of a few lone geniuses working in isolation. However, scientists have long realized the value of sharing their knowledge through research, publication, and teaching. In early modern Europe, learned societies such as the Royal Society in London met to discuss the research and observation of its members. New discoveries were changing the way people thought about the world. Isaac Newton's work on gravity and Benjamin Franklin's on electricity were among the exciting scientific discoveries of the 17<sup>th</sup> and 18<sup>th</sup> centuries, but they were just two participants in a larger network of change and progress.

Aware of the growing body of scientific knowledge and curious to learn it all, Benjamin Franklin organized the American Philosophical Society to establish a scientific community in America. It was modeled after London's Royal Society and Dublin's Philosophical Society, and its six founding members included botanist John Bartram and lawyer-scientist Thomas Hopkinson. Fifty years later, the Society included a host of prominent Philadelphia intellectuals: founding fathers George Washington, Thomas Jefferson, and John Adams, and such international figures as the Marquis de Lafayette. The Society provided a forum for exchanging ideas and pooling skills and knowledge, and its members particularly strove to promote American science and invention.

### OBJECTIVES

Students will:

- Be introduced to the scientific community that developed in colonial America under the stewardship of Benjamin Franklin and the American Philosophical Society.
- Learn about the American Philosophical Society's early members and their accomplishments and contributions to the Western scientific revolution of the 17<sup>th</sup> and 18<sup>th</sup> centuries.
- Examine 17<sup>th</sup>- and 18<sup>th</sup>-century scientific achievements of individuals excluded from membership in the more established learned societies of that time period.

### TIME

This lesson and activity require two class periods.

### MATERIALS

- Library or Internet resources
- Benjamin Franklin. "A Proposal for Promoting Useful Knowledge Among the British Plantations in America." Available at [www.historycarper.com/resources/twobf2/useful.htm](http://www.historycarper.com/resources/twobf2/useful.htm).

### McREL STANDARDS

#### History/World History

Standard 27. Understands major global trends from 1450 to 1770

**History/U.S. History**

Standard 4. Understands the emergence of social, religious, and political institutions in the English colonies

**History/Historical Understanding**

Standard 2. Understands historical perspective

**LESSON AND ACTIVITY**

1. Homework

Prior to beginning discussion, assign students “A Proposal for Promoting Useful Knowledge Among the British Plantations in America.”

2. Inquiry/Discussion

Begin lesson by posing the following questions: If you were a scientist with an important new discovery, whom would you tell about it? How would you publicize your discovery? Answers will probably include the Internet, journals, newspapers, magazines, and other media. Friends and colleagues may also be mentioned.

Ask the students whether or not they believe that the comments of other scientists would be valuable, and if so, why? Lead the discussion to the value of having peers in the scientific community examine, evaluate, further test, and otherwise validate (or challenge) new scientific observations and theories.

3. Information

Ask students to talk about Franklin’s proposal to establish the American Philosophical Society. Students should address Franklin’s vision of forging a scientific community in the colonies. You may want to remind students that in an era before widespread public education, private discussion groups and learned societies were vital to a nation’s cultural and intellectual growth. You may also want to provide students with additional context for the discussion by noting the establishment of other learned societies in Europe and America in the late 1600s and early 1700s. (See [www.royalsoc.ac.uk](http://www.royalsoc.ac.uk) for information on the Royal Society in Britain and [www.amphilsoc.org/](http://www.amphilsoc.org/) for information on the American Philosophical Society.)

4. Investigation 1

Divide the class into groups and assign each group the task of preparing a brief presentation describing the individual scientific accomplishments of the below individuals who were early members of the American Philosophical Society. Students can refer to the Internet or their school library to conduct their research.

- Benjamin Franklin
- Thomas Jefferson
- David Rittenhouse
- John Bartram
- Francis Hopkinson

When individual students have completed their research, each group will develop a response to the question of whether or not the above individuals constituted a community and if so, what value this community added to 18<sup>th</sup>-century society. Class will meet as a whole and share their ideas and conclusions.

5. Investigation 2

The group repeats the same exercise as above, but this time researches the accomplishments of the 18<sup>th</sup>-century women and people of color in science including:

- Maria Gaetana Agnesi
- Emilie de Breteuil, Nichole-Reine Lepaute, Sybilla Master
- Maria-Sophie Germain
- Maria Sibylla Merian, Elizabeth Luca Pinckney
- Benjamin Banneker

6. Inquiry/Discussion

Again, the class as a whole will discuss the respective accomplishments of the above scientists and address whether or not this group of scientists was part of an “established” scientific community. You may point out to students that although many people contributed to the expanding body of scientific knowledge in the 18<sup>th</sup> century, some of those individuals were excluded from membership in the more established scientific societies because of race or gender or simply because they were deemed amateurs, lacking proper formal training. Ask students how science is best served?

7. Writing

Students will write an article for an 18<sup>th</sup>-century national science newsletter. The articles may address any theme reflective of this lesson plan, including (but certainly not limited to) a profile of an 18<sup>th</sup>-century scientist, a summary of 17<sup>th</sup>- and 18<sup>th</sup>-century scientific discoveries, or a study of an 18<sup>th</sup>-century collaborative project or debate between two scientists (e.g., between Franklin and L’abbé Jean-Antoine).

**ASSESSMENT**

Students are graded on the quality of their class participation, investigative group work, and newspaper article.

**EXTENSION ACTIVITIES**

- Build a Web site that gives a more complete picture of the scientific community of the 18<sup>th</sup> century.
- Form a Science Society in your class, grade, or school in which students share their recent reading, observations, experiments, and findings.

**FURTHER RESOURCES**

- [www.des.emory.edu/mfp/Kuhn.html](http://www.des.emory.edu/mfp/Kuhn.html)
- [www.royalsoc.ac.uk/](http://www.royalsoc.ac.uk/)
- [www.amphilsoc.org/](http://www.amphilsoc.org/)
- <http://inventors.about.com/library/inventors/blbanneker.htm>
- [www.enetis.net/~surveyor/nshof/rittenhouse.html](http://www.enetis.net/~surveyor/nshof/rittenhouse.html)
- [www.dep.state.pa.us/dep/PA\\_Env-Her/john\\_bartram.htm](http://www.dep.state.pa.us/dep/PA_Env-Her/john_bartram.htm)
- [www.colonialhall.com/hopkinson/hopkinson.php](http://www.colonialhall.com/hopkinson/hopkinson.php)
- [http://earlyamerica.com/review/2000\\_fall/jefferson\\_paleon.html](http://earlyamerica.com/review/2000_fall/jefferson_paleon.html)

- [www.geocities.com/bioelectrochemistry/franklin.htm](http://www.geocities.com/bioelectrochemistry/franklin.htm)
- [www.astr.ua.edu/4000WS](http://www.astr.ua.edu/4000WS)
- Burns, William E. *Science and Technology in Colonial America*. (Greenwood Press, 2005).
- Meltzer, Milton. *Benjamin Franklin: The New American*. (NY: Franklin Watts, 1988).