Swedenborg: Scientist 1710—1747

Lesson Overview

1. **BrainBuilder**
2. **Watch a Video**

Watch *Emanuel Swedenborg, Scientist 1710-1747* (9min 5sec), at bitly.com/ESwedenborgScientist

3. **Discuss**

Choose questions to discuss, pp. 1-2. The video script is provided on pp. 3-4.

Emanuel Swedenborg

Swedenborg was a contemporary of Bach, Ben Franklin, Kant, Wesley, and Newton, living at the time of the first full flowering of what we now think of as modern science. For the first two-thirds of his life, he was immersed in the physical and biological aspects of science and in philosophy. He wrote voluminously and originally about them.... He lived during the last time in history when one person could master in a lifetime the full sweep of Western philosophic and scientific thought. And this is just what he did, while living an active political life and working as an engineer and mineralogist. He was a da Vinci-like genius of the first magnitude, what would later be called a "system" thinker. In Emerson's words, he was a man "not to be measured by whole colleges of ordinary scholars." *See Swedenborgdigitallibrary.org*

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BrainBuilder

Get students thinking about Swedenborg's work on the forefront of discovery by brainstorming a workable approach to a problem of today. Divide students into pairs. Each pair will choose a problem from the list below. Brainstorm possible approaches to solving the problem for 2 minutes. Report back to the group and discuss.

Scientific Problems

1. Global warming.
2. Medications to solve health problems.
3. Renewable energy production.
4. Cyber crime prevention.
5. Increasing food production to meet population need.

Video

Watch *Emanuel Swedenborg | Scientist 1710-1747* (9min 5sec) at bitly.com/ESwedenborgScientist. (Enter the bitly link in the search bar at the top of your screen.)

Discuss the video

Choose questions for discussion.

1. What insights did you gain about Emanuel Swedenborg from watching the video?
2. Compare Emanuel's college experience with the experiences of young adults today. What similarities and differences did you notice?
3. In what ways did Emanuel's education prepare him for a career as a scientist and later as a revelator?
4. Which of the following words characterize Swedenborg as a young man?
    a. industrious
    b. inquisitive
    c. impulsive
    d. spontaneous
    e. ambitious
    f. all of the above
5. Describe Emanuel's research goals as a young man.
6. Why was Emanuel so interested in metallurgy?

7. How might Swedenborg's knowledge of methods of scientific investigation have helped him serve the Lord later in life?
8. In what ways was Emanuel like other young adults?
9. What set Emanuel apart from other young adults?
10. Emanuel had contacts with the king of Sweden and Swedish nobility. What opportunities might this have given him? What impact might this have had on his scientific career or his work as a revelator?
11. What was Swedenborg's occupation?
12. How did Emanuel use his free time?
13. Emanuel actively participated in important research on ways to determine longitude at sea. This problem was so important that the British government eventually offered cash prizes for anyone who could solve it. What method did Emanuel come up with? Was it successful? (Interestingly, he returned to this problem again much later in life and stuck by his original ideas.)
14. If you were Emanuel Swedenborg, how might you spend your time while you are on vacation?
15. What question did Emanuel pursue towards the end of his scientific career?
16. In 1736 Swedenborg went to Paris to study anatomy because he could observe human dissection there. Ultimately he chose not to pursue his own investigations but to use work done by others. Why was this?
17. What inventions or discoveries are attributed to Emanuel Swedenborg?

Swedenborg Scientific Association

The Swedenborg Scientific Association is an organization that works to make the scientific and philosophical works of Emanuel Swedenborg available as widely as possible. The Association preserves his books, translates them into many languages, publishes, and distributes them. Historically, the Swedenborg Scientific Association played a central role in collecting and preserving Swedenborg's published and unpublished work. Today, they publish works of current scholars writing about Swedenborg's works and the environment in which they were created—scholarship that helps people understand Swedenborg's as a person and Swedenborg's work. The Swedenborg Scientific Association's journal is called *The New Philosophy*. You can find them online at http://swedenborg-philosophy.org/.

Emanuel Swedenborg

Swedenborg's achievements in the physical sciences were great. He speculated about the nature of matter and the universe and anticipated the cosmology later formulated by Immanuel Kant (1724-1804) and Pierre Simon, marquis de Laplace (1749-1827) that the planets in the solar system originated in the solar mass.

He published a theoretical book on the physical sciences, The Principia (the First Principles of Natural Things) in 1734. Turning his attention to the human body, he studied its anatomy and physiology in an attempt to discover the seat of the soul. At one point he thought that the blood might be the carrier of the soul. Fifty years before the discovery of oxygen by Joseph Priestley (1732-1804) he came near to discovering how the lungs purify the blood. He also made discoveries about the brain and the nervous system which were way ahead of his own time.

He gave an accurate account of the importance of the cerebral cortex as the seat of the higher psychical functions. Later scientists have praised him for his insight into the function and importance of the pituitary gland. He also anticipated modern thinking on the left brain and right brain functions. His published works of this period include The Economy of the Animal Kingdom (1740-1) and The Animal Kingdom (1744-5). Published posthumously were The Cerebrum (1738-40), and The Brain (1742-4).

Emanuel Swedenborg: Inventor and Philosopher http://www.swedenborg.org.uk/emanuel_swedenborg

Emanuel Swedenborg | Scientist 1710-1747

Video script by Sarah Bruell Odhner

Emanuel Swedenborg is one of the most brilliant scientists ever to have lived. He is sometimes called a "polymath" because he mastered so many different fields. Today we're going to discover where his scientific passions led him.

Emanuel entered university at age 11, and graduated with a degree in Philosophy at 21.

Although his degree was in philosophy, he also studied mathematics, sciences, history, poetry, rhetoric, politics, Latin, and Greek.

Shortly afterwards, he set off on a trip. He was so eager to travel and learn that he left for London without telling his family!

When the ship arrived in London, passengers learned that the plague had broken out in Sweden. Everyone was ordered to stay on board for forty days in quarantine.

Emanuel couldn't wait. Some friends convinced him to slip overboard and into a small boat and go ashore. This was a serious crime. When they were discovered they only escaped the death penalty because a powerful English family friend helped them.

London was exciting! St. Paul's cathedral was just being finished. People met in the popular coffee houses to visit and discuss the latest news.

Emanuel chose to stay with craftsmen so he could learn various trades. Over five years he studied watch making, lens grinding, cabinet making, engraving, and making scientific instruments from brass.

Shortly after arriving a scientific society in Uppsala, Sweden (Collegium Curiosorum) commissioned him to buy equipment and scientific books to send to Sweden, which was less scientifically advanced. Emanuel took the job seriously and went to visit England's top scientists.

First he visited John Flamsteed, founder of the Royal Greenwich Observatory. Flamsteed had discovered the planet Uranus, and catalogued the stars in the northern hemisphere.

He was working on a way for ships to find their position at sea. He thought you could use the stars to work out longitude. Emanuel had his own idea for doing this using the moon.

Next, Emanuel went to see Sir Edmund Halley, for whom Halley's comet is named. Halley had charted the stars in the southern hemisphere. He also discovered the orbits of comets. Emanuel discussed the longitude problem with Halley.

John Woodward, another scientist he visited, studied the history of rocks and fossils. Woodward's careful methods of experiment and observation made a big impression on him. Emanuel decided to use similar methods for his own work.

He met Sir Hans Sloane, a wealthy collector who helped set up the British Museum and London's Museum of Natural History.

Emanuel's colleagues questioned his ideas about the way to calculate longitude. Emanuel left England and headed for Holland, Belgium, France, Germany and Pomerania.

He met with mathematicians, engineers and theologians everywhere he went. He made notes on many scientific ideas. He wanted to bring practical discoveries back to Sweden.

Just before returning home, Emanuel sent a letter to his brother-in-law (Erik Benzelius) with plans for 14 inventions, including an airplane, a submarine, a machine gun, a mechanical carriage, hydraulic pumps, and ideas for a new psychology—all years before they were invented by others.

When he got back to Sweden he was 27. He soon started Sweden's first scientific journal (Daedalus Hyperboreus), featuring his inventions, and also the inventions of a Swedish scientist, Christopher Polhem.

Emanuel became Polhem's assistant. Through Polhem, he met King Charles the 12th. The king was very impressed with Emanuel and made him an extra-ordinary assessor to the Board of Mines.

Mining was very important in Sweden. Iron made up 70% of Sweden's exports. The Board of Mines controlled the production and quality of Sweden's copper and iron. This appointment gave Emanuel an important way to serve his country.

He visited German mines so he could learn how to increase outputs from copper ore. He shared what he learned by writing books on mining and metallurgy.

Emanuel was also a good mathematician. He published Sweden's first algebra book (1718).

In 1719 Swedenborg's family was ennobled by the queen (Queen Ulrica Eleanora). As the eldest son, Emanuel became a member of the House of Nobles--a branch of the Swedish government like the House of Lords in England.

A few years later he was promoted to a full-time assessor on the Board of Mines. In his new job he wrote important regulations and laws that affected Sweden's wealth. It was a huge job. He worked 6six days a week, ten months a year. He traveled around Sweden advising mine owners on ways to improve smelting, and judging industrial disputes.

On the side he researched and published books and articles on astronomy, geology, salt manufacturing, sluices, anatomy, and Sweden's economy.

He wrote poetry to celebrate special events, as he had done since he was young.

Emanuel published three volumes on the physical sciences (The Principia, 1734). In them he anticipated atomic theory by suggesting that matter was made up of motion arranged in geometric patterns. He also explained the formation and evolution of the solar system in a way that laid the basis for modern theories.

In the new scientific age, many people were wondering whether religion and science could co-exist. Emanuel combined philosophy with the science of metallurgy.

He was beginning to feel unsatisfied with scientific explanations of the universe. He began to look for a link between an infinite God and His finite creation. He published a small book in which he tried to explain how the finite and infinite were connected; how the soul lives in the body (Infinite and Final Cause of Creation, 1734).

He decided to search for evidence of the soul in the human body and went to Paris, where he could study human anatomy.

As he traveled through Holland and Belgium, he made notes on the countryside, and issues such as how to deal with woodworms and termites, how to make fences, and how to make window glass.

In Paris, he went to medical lectures and watched human dissections. He found them fascinating but in the end decided to stop doing his own research. He decided to use other people's drawings in his search for the soul, so he could be more objective.

He took holidays to Italy, stopping to see famous landmarks everywhere he went. He watched parades, visited churches, historic sites, universities and art galleries.

After the trip he published a book about the soul (The Soul's Kingdom, 1744) that focused on the circulatory system. He came close to discovering how the lungs purify blood, years before oxygen was discovered. In all he planned seventeen volumes about the body. He made detailed notes on the brain, anticipating modern thinking by identifying right and left brain functions. But he never finished the series.

He became more and more interested in other things. While he did not find physical evidence of the soul he realized that the body was the clothing of the soul. The real person, the person that continued living after death, was the soul itself.

At age 57, after a full career as a civil servant and scientist, Emanuel retired. He gave up a huge scientific career so that he could explore the question of human existence itself.