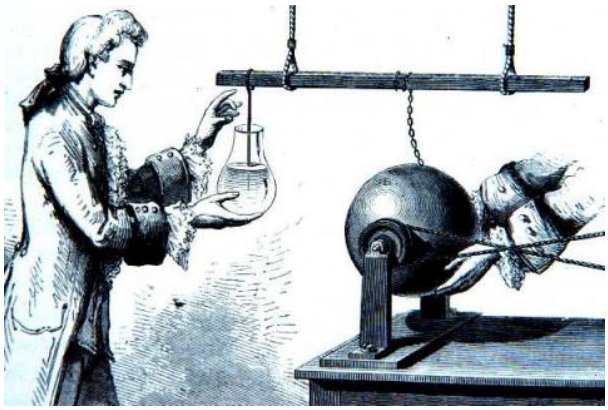
AWESOME stories

THE LEYDEN JAR



In 1746, while visiting Professor Pieter van Musschenbroek's lab in Leiden (The Netherlands), Andreas Cuneus (a Dutch lawyer, scientist and erstwhile Professor's assistant) received an extremely powerful shock. This artist's conception depicts Cuneus, in the lab, attempting to condense electricity in a glass of water. When he tried to pull the wire out of the water, Cuneus was stunned by the magnitude of the shock he received (since it was much worse than that produced by an electrostatic generator, seen on the right side of the drawing). It took him two days to recover. The illustration is Figure 382, at page 570 of *Elementary Treatise on Natural Philosophy, Part 3: Electricity and Magnetism*, by Augustin Privat Deschanel (translated and edited by J. D. Everett), published in New York, during 1876, by D. Appleton and Co. Online via Google Books.

Early experimenters, trying to understand electricity, wondered about its properties:

- If electricity flows (like water), could it be stored (like water)?

- Since glass is an insulator, could electricity be stored in a glass jar?

- If we pour water into a glass jar, then we position a metal wire into the water-containing jar - hooked, at the top, to a Hauksbee electrostatic generator - what would happen?

Pieter Van Musschenbroek (a Professor working at Leiden University, in The Netherlands) was particularly keen to store electricity. He wanted to have it readily available for his crowd-pleasing electrical experiments.

When the Professor tried to generate electricity, with his Hauksbee device, he placed a glass jar on an insulator (so the charge would stay in the jar). The problem was ... the charge *didn't* stay in the jar.

One day, while working with his system, the Dutchman accidentally forgot to place the jar on an insulator (holding it, instead, in his hand). To van Musschenbroek's utter amazement, when he held the jar in his hand, instead of placing it on an insulator, the electrical charge stayed in the glass jar.

When he touched the top of the jar with his other hand, van Musschenbroek was further stunned when he received a massive shock. The shock was so enormous that soon after van Musschenbroek said one such jolt was enough for a lifetime. In a letter to a Paris colleague, he wrote about it:

> *...I would like to tell you about a new but terrible experiment, which I advise you never to try yourself, nor would I, who have experienced it, and survived by the grace of God, do it again for all the kingdom of France.* (Pieter van Musschenbroek to René Réamur, quoted by J. L. Heilbron in *Electricity in the 17th and 18th Centuries: A Study of Early Modern Physics*, at page 313.)

Despite the danger to himself, the Professor (with the help of his assistants) had figured-out how to store electricity in a glass bottle—known forever after as a "Leyden Jar"—which he could use hours, or even days, later. The key, to staying unharmed, was to keep his hand away from the top of the bottle.

News about the Leyden Jar spread, quickly, around the world. From Asia, in the east, to Philadelphia, in the west, people were intrigued to experiment with this amazing idea ... but ... no one knew why, or how, the Leyden Jar worked.

One of the people in the west—a chap who lived in Britain's American colony of Pennsylvania—pondered these things. *His* name was Benjamin Franklin.

See Alignments to State and Common Core standards for this story online at:
http://www.awesomestories.com/asset/AcademicAlignment/THE-LEYDEN-JAR

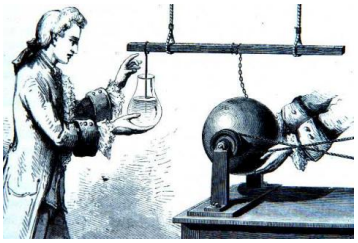
See Learning Tasks for this story online at:
http://www.awesomestories.com/asset/AcademicActivities/THE-LEYDEN-JAR

Media Stream

Pieter van Musschenbroek
Image, described above, online courtesy Wikimedia Commons.
PD
View this asset at: http://www.awesomestories.com/asset/view/Pieter-van-Musschenbroek

Professor van Musschenbroek about to be Shocked
Image, described above, online courtesy “Van Musschenbroekstraat Online.”
PD
View this asset at:
http://www.awesomestories.com/asset/view/Professor-van-Musschenbroek-about-to-be-Shocked

Early Leyden Jar
Cropped image (Figure 64 at page 107) from the Fifth Edition of "Magnetism and Electricity," by W. Jerome Harrison and Charles A. White, published in London, during 1898. Online, courtesy Google Books.
PD
View this asset at: http://www.awesomestories.com/asset/view/Early-Leyden-Jar



THE LEYDEN JAR
View this asset at: http://www.awesomestories.com/asset/view/