Eunice Newton Foote (1819 – 1888) was an American inventor, scientist, and women’s rights campaigner. She was the first scientist to put forth that sunlight can warm certain gases, and that rising CO₂ levels would change atmospheric temperatures and affect the climate – what we now know as the Greenhouse Effect. Eunice passed away in 1888, leaving her scientific contributions unknown for almost 100 years. In recent years, new interest has arisen in her work as it has been shown to predate the work of John Tyndall, the scientist typically credited with discovery of the Greenhouse Effect, by five years!

“...The receiver containing the gas became itself much heated — very sensibly more so than the other — and on being removed, it was many times as long in cooling.”

Trapped Heat: The Vicious Cycle
The Earth is constantly being hit with light from the sun. Some of this light is absorbed by the Earth’s surface. After absorbing the light, the Earth releases this energy in part by emitting infrared radiation. Some gases, naturally present in our atmosphere, absorb some of the infrared radiation and heat up the atmosphere, keeping our planet temperate. But since the advent of human industrialization, the amount of these gases absorbing infrared radiation in our atmosphere has increased dramatically. Methane concentration in the atmosphere has increased 2.5 times since the start of the Industrial Age, with nearly all of that occurring since just 1980. Without proper mitigation strategies, the problem will continue to grow — and could lead to Earth becoming similar to Venus, whose inhabitability is due in part to its own Runaway Greenhouse Effect it experienced in the past.

Experiment: Simulate the Greenhouse Effect
Here we list two experiments to illustrate how we realized that dark matter exists in the Universe.

What you need
1. Two clear 2-liter soda bottles. Remove the label and cap, rinse the bottles out.
2. Water
3. Duct tape
4. Scissors
5. Two glass thermometers (or digital thermometer probes)
6. A handful of seltzer tablets
7. A tabletop lamp (with a bulb of at least 100 W)
8. Timer

Procedure
1. Partially fill both of the soda bottles with water.
2. Cover the top of one bottle with the duct tape and poke a small hole through the top with scissors.
3. Put the thermometer in the hole and secure it in the center such that the bottom of the thermometer is resting in the air above the water.
4. Drop some seltzer tablets in the other bottle and immediately cover in a similar manner as the first bottle.
5. Quickly record the temperatures of each bottle.
6. Turn on the lamp to warm both water bottles, making sure its light is shining directly and evenly on both bottles.
7. Observe and record the temperature of each bottle every 20 minutes for the next hour or so.
8. At the end of the recording time, which bottle shows a higher temperature?
9. To extend the experiment, turn off the light and record the temperature more frequently as the bottles cool off. Which bottle takes a longer time to return to room temperature?