

Meanwhile, in America, in the 1840s and 1850s...

Eunice Foote conducts experiments

2011, Oklahoma, USA

Raymond Sorenson checks the same record for the fifth time. Stacks of technical books and journal articles lay forgotten on his basement floor. Carefully, he turns the delicate yellow page in the 150-year-old annual.

Raymond, an amateur historian, dares not believe it. He knows that the record will cause a sensation in the history of science. But before he shares it, he needs to know more of the story behind it. Her story.

It is 1848. We are in Seneca Falls. While farmers back in England drain the last mere in the Fens, here in New York State the farmers are slower to ditch and dyke their wetlands. There is so much cheap land here in America! The British colonists kept expanding their farmsteads in the 1700s, planting more wheat and barley, and then oats and corn. By the 1800s, American farmers rotate crops and grow turnips.

A connected town

The town of Seneca Falls is well-connected. Farmers transport crops and wool to market by boat on the Erie canal. Workers in the growing towns have a reliable food supply. Textile mills are built across the county. Some say the mills make woollen cloth as fine as the factories in Britain!

The new woollen mill in Seneca Falls, a three-storey factory powered by coal, clanks and rattles by the canal. Directly opposite is another redbrick building: the Wesleyan Chapel. Do you remember John Wesley? He had travelled to America in 1735 to spread his Methodist ideas about God and the Bible to colonists and Native American communities. Wesley returned home, but many Methodists stayed.

Secrets in town

It isn't just farmers who use the canal, Methodists use it too. But they don't transport food. They transport people: runaway slaves. Do you remember that slavery was ended in British colonies by 1838? Enslavement will not end in America until 1865.

Methodists and other Christian groups believe slavery is unchristian. They help thousands of runaways move along Erie Canal and onto the Great Lakes and Canada - to freedom. Slavery is outlawed in Canada. This secret network of rivers and roads transporting runaway slaves has a name: the 'underground railroad.'

A town meeting, mid-July 1848

It is stifling in the Wesleyan Chapel. People have been arriving all morning. Now over 200 women sit sweating in large, hooped skirts. Finally, the doors close. The discussions begin.

The women, and a few men, discuss ending slavery. They discuss ending men's control over women's lives. Voices grow louder. Women should be able to inherit property. They should be able to vote, have equal pay with men, be government leaders. Something must be done.

Do you remember Thomas Jefferson and the Declaration of Independence of 1776? Jefferson stated that 'all men are created equal'. Now, in 1848, one hundred people sign a 'Declaration of Sentiments' stating all men **and women** are created equal.

A local woman from town is the fifth person to sign the document. Her name is Eunice Foote. The seventy-third person to sign is Eunice's husband. The seventy-fourth person to sign is Frederick Douglass, a former slave and abolitionist.

Eventually, the meeting ends, but the campaign for women's rights will spread far beyond the chapel. Frederick Douglass will continue his campaign to end slavery. Eunice walks home to tend to her two children.

Eunice experiments

Ordinary town life resumes. Smoke billows out of the redbrick chimney of the woollen mill. Boats move along Erie canal at night. In the mornings, Eunice shops for bonnets and ribbons and in the afternoon she reads books and journals: political statements and scientific discoveries. Huge teeth have been found in Montana in 1855! Are they the first dinosaur teeth to be discovered in North America? How old are the teeth? How old are *humans*? Can humans really have walked the Earth for 200,000 years?

Eunice writes a new shopping list: two glass jars, thermometers, and an air pump. It's time to start experimenting. Eunice pumps air into one jar and different gases into the other, one at a time. After exposing the jars to the sunlight, she makes a discovery. 'The highest effect of the sun's rays I have found to be in carbonic acid gas (carbon dioxide)', she says. 'An atmosphere of that gas would give to our earth a high temperature.'

In 1856, Eunice is ready to present her research at a scientific meeting. A friend introduces her. 'Ladies are so beautiful – and so gifted!', begins the male scientist. Eunice smiles.

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Raymond Sorenson is back in his basement checking his email. There is a new message. It is from the historian Roland Jackson. The historian says that he will include Foote's discovery in a new book about the history of science. 'Foote's work is like a meteor', writes Jackson. 'It shone brightly, then disappeared from view.'

Raymond told the world what he found. The rediscovery of Eunice's research caused a sensation. Eunice didn't measure the natural greenhouse effect of earth, but she did measure the heating of the atmosphere in her glass jars, which acted like a greenhouse. Eunice died in 1888.