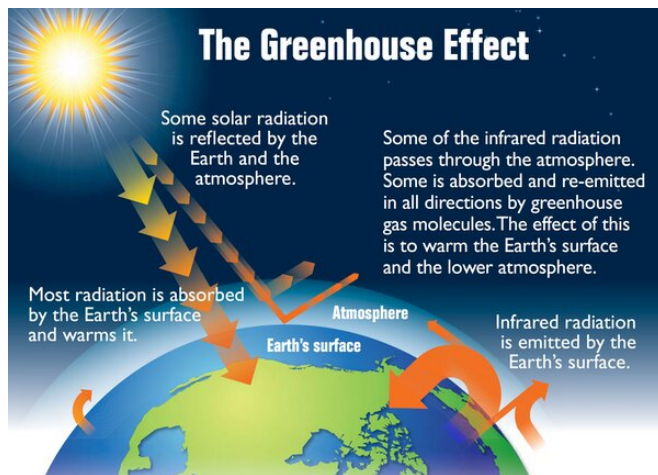


John Tyndall: the forgotten co-discoverer of climate science

31 July 2020, by Roland Jackson



The greenhouse effect. Credit: US EPA

It is surprising that the Irish scientist John Tyndall, born 200 years ago on August 2 1820, is not better known. This is despite the existence of the [Tyndall Centre for Climate Change Research](#), the [Tyndall National Institute](#) and the [Pic Tyndall](#) summit on the Matterhorn in the Alps. There are even several [Mount Tyndalls](#), Tyndall glaciers and [Tyndall craters](#) on the Moon and Mars.

From that, you could surmise that he was both a significant scientist and a notable mountaineer. Yet, due to unfortunate circumstances, he is no household name.

In 1859, Tyndall showed that gases including carbon dioxide and water vapour [can absorb heat](#). His [heat source](#) was not the Sun, but radiation from a copper cube containing boiling water. In modern terms, this was [infrared radiation](#) – just like that emanating from the Earth's surface.

Previous work had shown that the Earth's temperature was higher than expected, which was put down to the atmosphere acting as an insulator.

But no-one knew the explanation for what we now call [the greenhouse effect](#) – gases in the atmosphere trapping heat.

What Tyndall did was to discover and explain this mechanism. He [wrote](#): "Thus the atmosphere admits of the entrance of the solar heat; but checks its exit, and the result is a tendency to accumulate heat at the surface of the planet."

He realised that any change in the amount of water vapour or carbon dioxide in the atmosphere could change the climate. His work therefore set a foundation for our understanding of climate change and meteorology.

Tyndall was not, however, the first to make the climate link. That prize goes to the American [Eunice Foote](#), who showed in 1856 using sunlight that carbon dioxide could absorb heat. She suggested that an increase in carbon dioxide would result in a warmer planet.

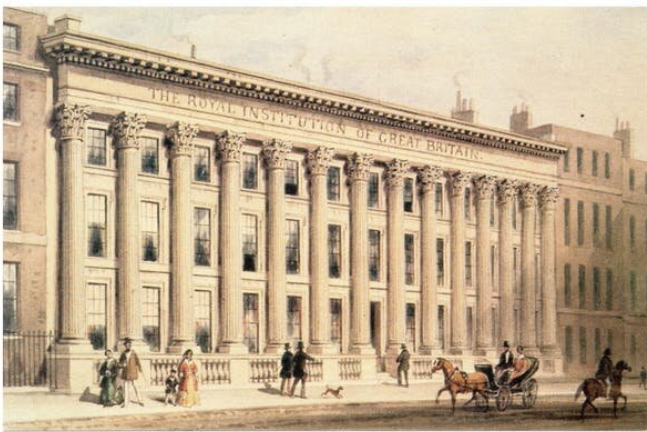
Research suggests Tyndall [was unaware of her work](#). He would no doubt have been surprised to find that an amateur woman had beaten him to a general demonstration of the absorption of heat by [carbon dioxide](#). To his discredit, he did not believe that women possessed the same creative abilities in science as men.

Tyndall made many other discoveries in disparate fields of physics and biology. He made his initial reputation in the obscure topic of diamagnetism, the weak repulsion of substances by a magnet. That brought him to the notice of influential people such as physicist [Michael Faraday](#).

Within a few years he was a fellow the [Royal Society](#), Britain's most prestigious scientific body, and professor of natural philosophy at the [Royal Institution](#), where he remained for the rest of his scientific career.

Soon he was at work on understanding glacier structure and motion. After that came the work on the absorption of heat by gases, and then the action of light in causing chemical changes. In the process Tyndall explained why the sky is blue—blue light is [scattered more by gases](#) in the sky than other colours because of its short wavelength.

He also discovered "Tyndallisation"—a bacteriological technique of sterilisation—when undertaking experiments alongside French biologist [Louis Pasteur](#) to support the theory that germs can cause disease. That line of research led to the invention of a respirator for firefighters, though Tyndall never took out a patent. He committed himself to [fundamental research](#), confident that others would generate useful applications.



The Royal Institution of Great Britain from about 1838.

Science versus religion

As a public intellectual, Tyndall's was one of the loudest voices advocating a scientific explanation for the natural world and for life itself, a [scientific naturalism](#). In this, religion and theology had no place. He gave the starkest statement of this position in his famous, indeed notorious, [Belfast Address](#), in 1874.

In the Ulster Hall, he thundered: "We claim, and we shall wrest from theology, the entire domain of cosmological theory. All schemes and systems

which thus infringe upon the domain of science must, insofar as they do this, submit to its control, and relinquish all thought of controlling it."

But he was never one to belittle the role of religion. Science, for him, provided reliable knowledge of the world. Religion met people's emotional needs, a role he thought might eventually be replaced by poetry.

Representing the past

Tyndall didn't marry until he was in his 50s, but his beloved Louisa killed him by accident in 1893—giving him an overdose of the wrong medicine in the dark. She then gathered huge amounts of material to write his biography, but died 47 years later with it uncompleted.

Her drafts, as well as Tyndall's diaries, laboratory notebooks and thousands of letters, are held at the [Royal Institution](#) in London. All his correspondence is currently being published by the [Tyndall Correspondence Project](#). I was able to use the material when writing my biography [The Ascent of John Tyndall](#), just released in paperback for his birthday.

Louisa's failure to write a biography is part of the reason he is not better known, but he also had the misfortune to die on the cusp of revolutionary discoveries in physics such as quantum theory and relativity. In a sense, he represented the past.

But today, climate research is more important and pressing than ever—and scientists are making huge strides. I am sure Tyndall would be gratified to find that his foundational work had proved so important.

In his time, however, few people made the connection between the burning of fossil fuels and possible global warming. Tyndall was more worried that Britain would run out of coal and be unable to compete economically with America, given its vaster supplies. One imagines though that, as a scientist, he would be convinced by the current evidence.

Climate science is now the future rather than the

past, and it is therefore time to recognise and reinstate Tyndall as a major Irish scientist, mountaineer and public intellectual.

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