John Tyndall: His Pioneering Contributions to Climate Science and Scientific Outreach

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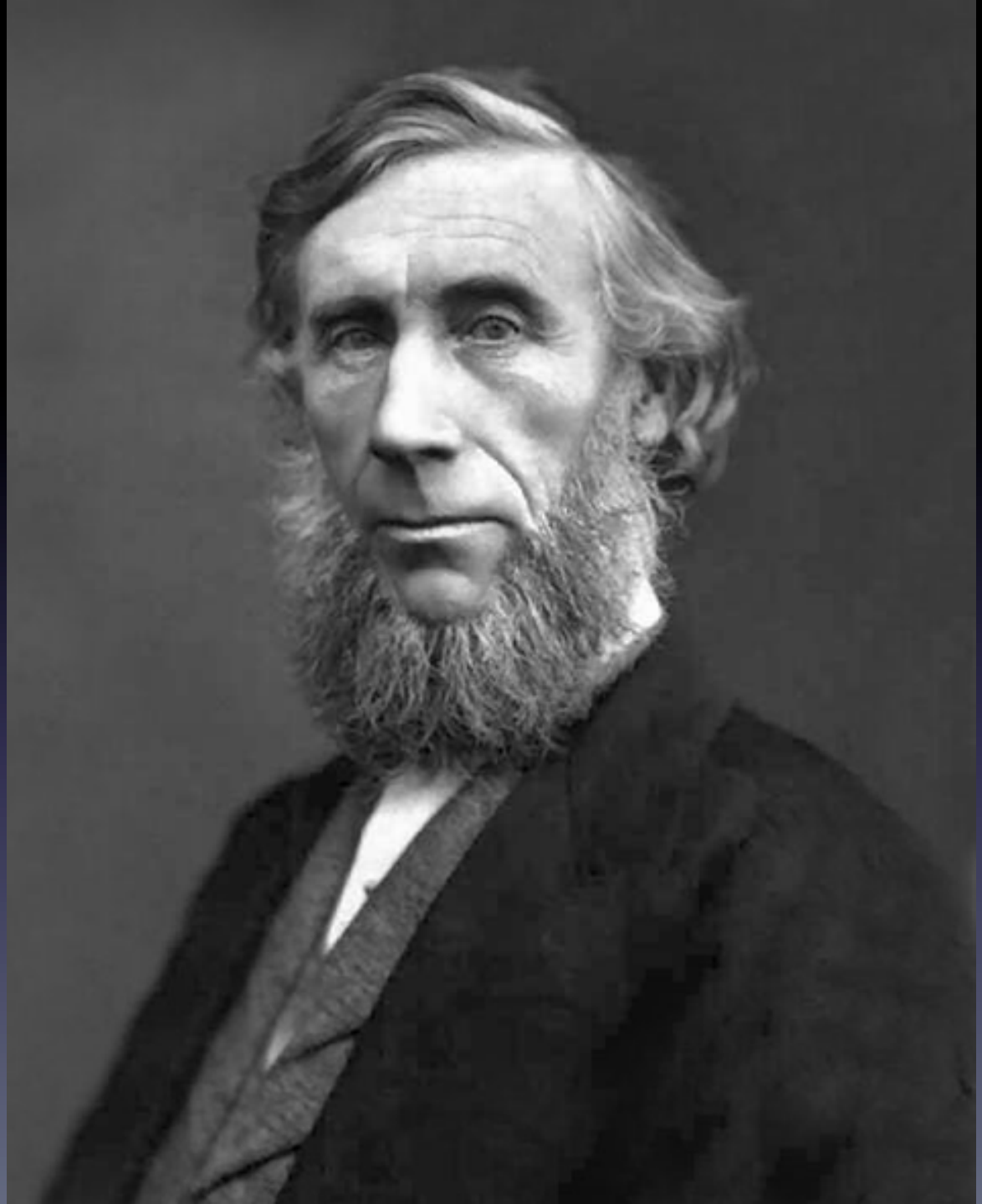


John Tyndall (1):

Born 2 August 1820, Leighlinbridge, County Carlow.

Family had come from Gloucestershire, 17th century.

Father a shoemaker and member of Irish Constabulary.

Father inspired in John a love of learning and debate.

He remained in school until age 17, an unusually late age.

John Tyndall joined the Irish Ordnance Survey at 18.

This job lasted 3 years: hard work, long hours, low pay.

In 1842, John transferred to the English Survey.

John Tyndall (2):

Unhappy, he was dismissed from the English Survey (1843).

He returned to Leighlinbridge, penniless and discouraged.

He was hired by a private surveyor in England in 1844.

He worked 3 years in the “railway mania” until 1847.

He then became a mathematics teacher in Hampshire.

The school, Queenwood College, was highly innovative.

With a friend, Edward Frankland, Tyndall studied science.

By 1848, they had decided to go to Germany for training.

John Tyndall (3):

The two arrived in Marburg, Germany in October 1848.

Robert Bunsen (1811-1899) made room for them in his lab.

Bunsen was already well known. He later discovered caesium and rubidium, and investigated emissions spectra.

Tyndall had only limited mathematics, science and German.

However, he worked intensely, and Bunsen was inspiring.

By 1850, Tyndall had completed his doctorate in physics.

His topic was on screw surfaces, far from his later interests.

John Tyndall (4):

He was warmly welcomed by the German science world.

Tyndall arrived back in England in 1851. He sought work.

To earn a living, he returned to Queenwood College.

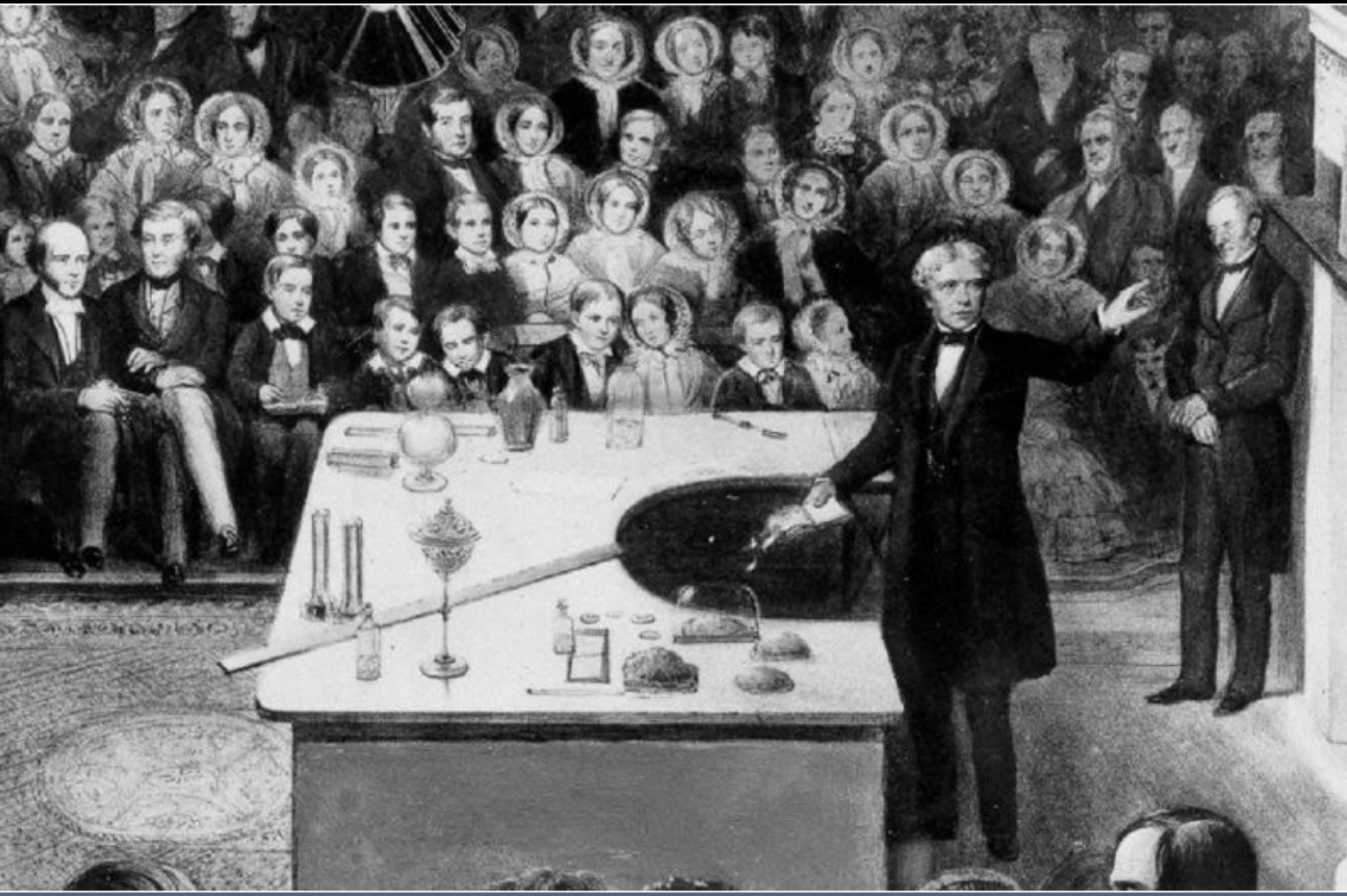
He failed to get jobs in Toronto, Sydney, Cork and Galway.

Nevertheless, he was elected to the Royal Society in 1852.

The decisive turning point came on 11 February 1853.

He gave a brilliant lecture that day at the Royal Institution.

Michael Faraday, a scientific superstar, was very impressed.



John Tyndall (5):

Tyndall gave additional lectures and was offered a position in May 1853 at the Royal Institution of Great Britain.

There he was elected Professor of Natural Philosophy.

Other job offers arrived too, but the chance to work with Faraday in London at the Royal Institution was decisive.

Tyndall would remain at the Royal Institution for 34 years.

It offered him an ideal opportunity to do experimental work.

It also was an ideal stage for Tyndall's talents as a lecturer.

John Tyndall (6):

As a lecturer on science to the public, Tyndall was superb.

He was obsessive in planning and preparing his lectures.

He devised and rehearsed spectacular demonstrations.

He had a strong sense of showmanship and great style.

He ranked with Faraday and Huxley as a popular speaker.

Carl Sagan or Jacques Cousteau might be his modern equals.

His lectures were the basis of many articles and books.

Tyndall became well known and eventually quite wealthy.

John Tyndall (7):

In 1876, Tyndall married. He was 56 years old.

His marriage, to Louisa Hamilton, was a happy one.

They had no children, but she shared his many interests.

These included Tyndall's love of Alpine adventures.

They built a home in the Swiss mountains above Bel Alp.

Ill health caused Tyndall's resignation from the R. I. in 1887.

He died from an accidental drug overdose 4 December 1893.

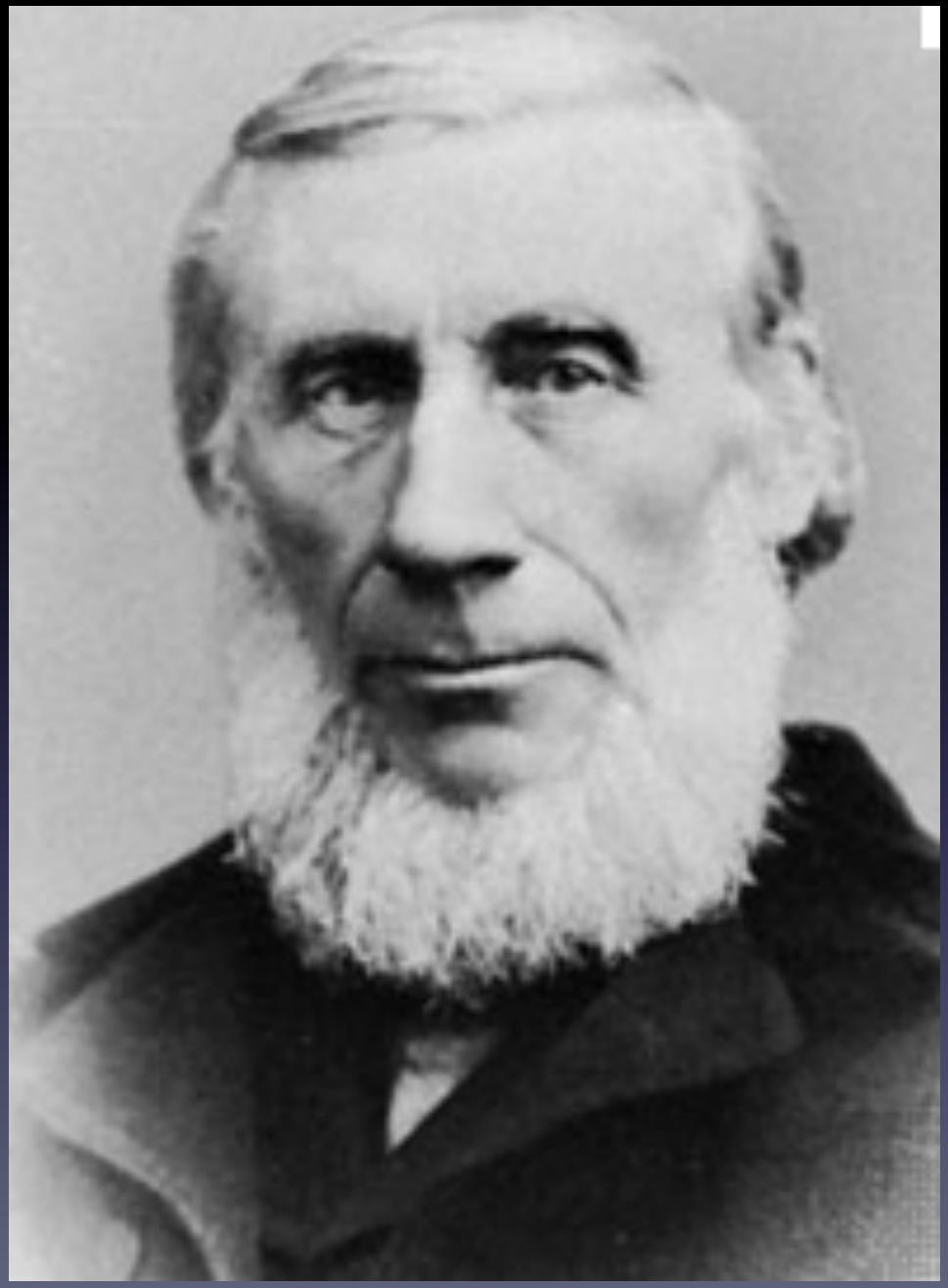
John Tyndall (8):

Tyndall's research interests were very broad.

Climate science values his work on gases and radiant heat.

He also did first-rate research on glacier motion, diffusion of light in the atmosphere, the germ theory of disease, diamagnetism, and many other topics.

He received many scientific honors and succeeded Faraday as Director and Superintendent of the Royal Institution.



John Tyndall (9):

It must be said that Tyndall enjoyed a good intellectual fight.

He has been described as “a keen controversialist.”

He has also been called “the very model of an Irishman: wild, athletic, a hard worker and a fluent talker.”

He had strong political views and was likely an agnostic.

Tyndall was also generous.

He gave large sums to support young American scientists going to Germany to study.

John Tyndall (10):

Tyndall's research on the absorption of "radiant heat" or infrared radiation by gases is of primary importance.

Fourier and others had theorized and speculated about it.

In fact, infrared energy had been discovered only in 1800.

It was still largely mysterious in mid-19th century.

Tyndall explored the "greenhouse effect" empirically.

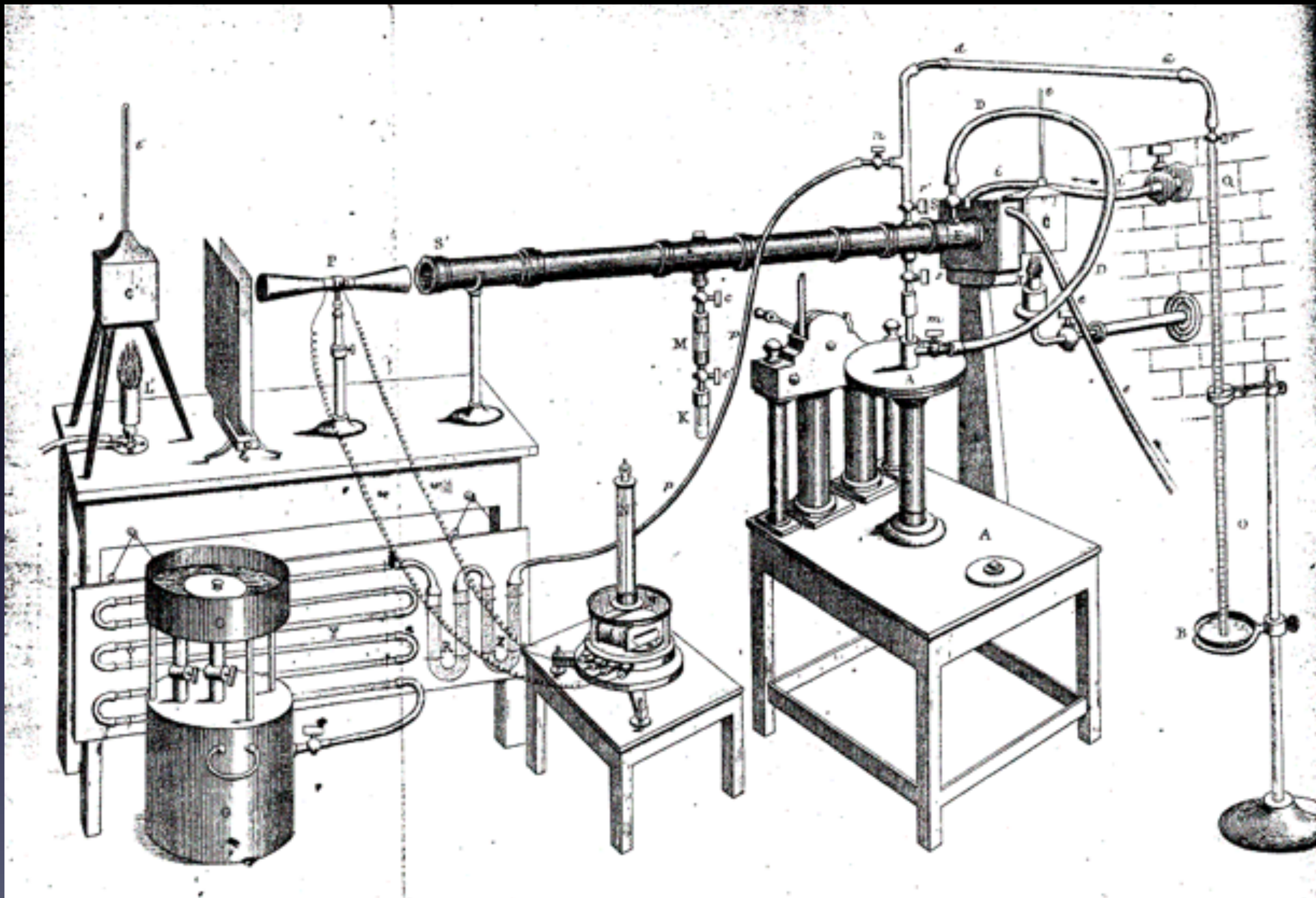
He invented the instrument, and he made the measurements.

John Tyndall (11):

Tyndall, in his 1861 paper, clearly realized the significance of his discovery for climate.

He wrote that “a slight change” in the amount of carbon dioxide or other absorbing gases could have important effects on climate:

“Such changes in fact may have produced all the mutations of climate which the researches of geologists reveal.”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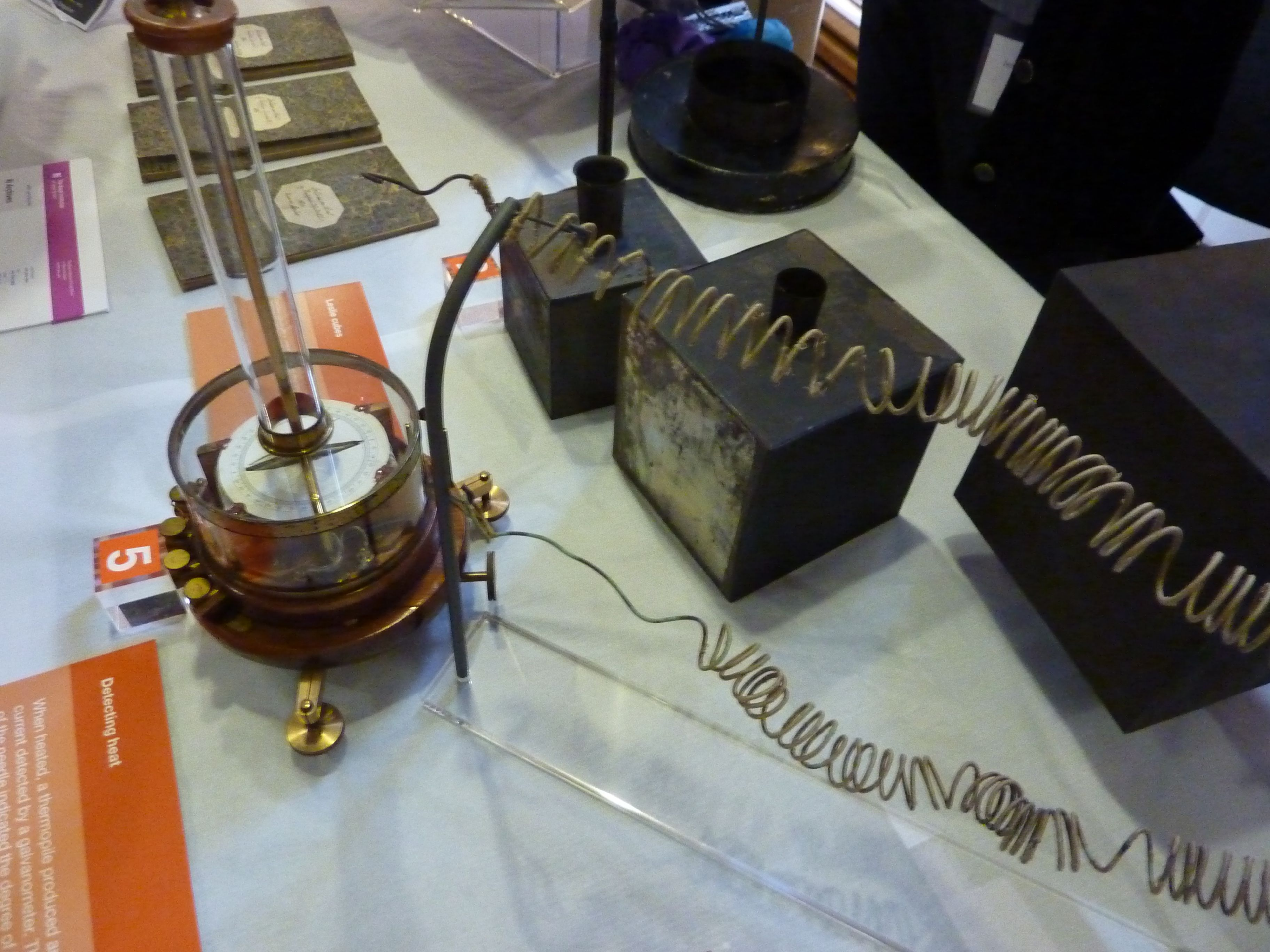
Leslie cubes
5
Detecting heat

More equipment
3
Such a complex experiment needed many pieces of equipment, including tools, washers, valves, tubes and stop cocks.
3
5


2


Climate changes
The science behind the 'greenhouse effect' was discovered at the Royal Institution in the mid-nineteenth century, using the apparatus you see here. Climate change is now a big concern for us all today.
John Tyndall wanted to know how different gases absorb heat from the sun. He found that water vapour, carbon dioxide and ozone absorb it much more easily than the most common gases in our atmosphere, nitrogen and oxygen. This means that they have a greater influence on the temperature of the earth's surface.
Tyndall demonstrated that the strongest absorber, water vapour, is the most important gas. It
heat leaking back into outer space.
greenhouse effect it creates,
cool down so much that
But modern-day


Climate changes

http://tyndallconference2011.org/