

# Hadley and Ferrel

## George Hadley

**George Hadley** was born in London on February 12, 1685 and died on June 28, 1768. He was the youngest of John Hadley, who became a recognized astronomer, inventor of the octant, precursor of the sextant for navigation. George Hadley was called to the London Bar as a lawyer in 1709 and has always been interested in his older brother's work, contributing to it with a contribution that he cites in his own publications. His personal interest in science focused on meteorology and more particularly on the study of winds in the tropics, which was a real challenge for the marine expeditions of the time. Although he approached these areas as an amateur, George Hadley became a sufficiently enlightened expert to publish in 1735, in the journal *Philosophical Transactions of the Royal Society*, the article *Concerning the Cause of the General Trade Winds* which, for the first time, showed that the westerly inclination of trade winds and the equatorial eastern current were consequences of the Earth's rotation. No photograph or portrait of George Hadley appears to be available, but the profile of John Hadley, his elder, is well known.

### VI. Concerning the Cause of the General Trade-Winds : By Geo. Hadley, Esq; F. R. S.

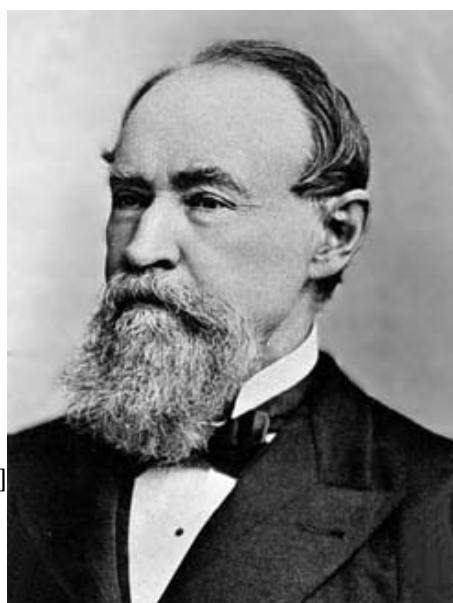
I Think the Causes of the General Trade-Winds have not been fully explained by any of those who have wrote on that Subject, for want of more particularly and distinctly considering the Share the diurnal Motion of the Earth has in the Production of them : For although this has been mention'd by some amongst the Causes of those Winds, yet they have not proceeded to shew how it contributes to their Production ; or else have applied it to the Explication of these Phenomena, upon such Principles as will appear upon Examination not to be sufficient.

That the Action of the Sun is the original Cause of these Winds, I think all are agreed ; and that it does

Begins of the

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George Hadley paper[/caption]



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Portrait of William

Ferrel.[/caption]

## William Ferrel

**William Ferrel**, born on 29 January 1817 and died on 18 September 1891 in the United States, was a self-taught teacher who had studied the most advanced scientific works of his time, including *Philosophiæ Naturalis Principia Mathematica* by Isaac Newton (1686) and the *Traité de Mécanique Céleste*, a five volume work by Pierre-Simon de Laplace written between 1799 and

**Registering** est-known article, *Essay on the winds and current in the ocean*, was published in 1856 in the *Nashville Journal of Medicine and Surgery*. This article echoes and complements George Hadley's predictions, showing that the Earth's rotation is not limited to bending the trade winds to the west and generating the equatorial eastern current. It shows that it influences all atmospheric circulation and requires the presence of three cells in each hemisphere, whereas Hadley considered only one from the equator to the pole. It thus explains the existence and high speed of the polar *Jet Stream* at high altitude. William Ferrel also contributed to the understanding of tides (1853), supplementing Laplace's predictions with the contribution of friction. William Ferrel was later recruited into the United States Army, where he participated in meteorological studies in a unit which became the *National Weather Service*.

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