

TIME TRAVEL

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How Did Maxwell Know That Light Vibrates Transversely?

Seriously folks, we can't look at light and see that it is vibrating, much less vibrating side-to-side. How did Maxwell know?

We have a sketch of six-year-old Maxwell at a dance. Instead of watching the dancer, he is intensely trying to figure out how the violin works. This is foreshadowing. A violin string vibrates transversely. It can do this because the violin string has shear strength. The music from the violin vibrates the air longitudinally. Air has no shear strength. It cannot vibrate transversely.

In April 1847, Prof. Nicol (a friend of Sir David Brewster) gave 15-year-old Maxwell a piece of Iceland Spar. A crystalline form of calcite, it exhibits birefringence, a kind of anisotropy. Everything appears doubled through it. That means there must be two different kinds of light wave. Today we call it, for example, vertical and horizontal, or right-hand and left-hand polarization. The only way we can have two kinds of waves is if it is transversely polarized. A sound wave in air cannot be polarized.

Maxwell decided to ignore several problems, for example, is light even a wave? Newton had insisted it was particles. And then if it is a wave, it must vibrate in some sort of medium, let's call it the 'Luminiferous Aether.' But the Earth plows through this supposed medium and does not

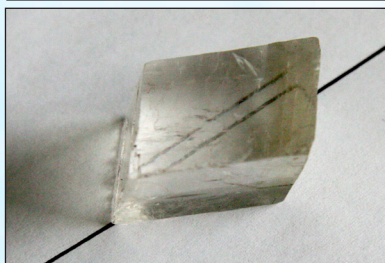
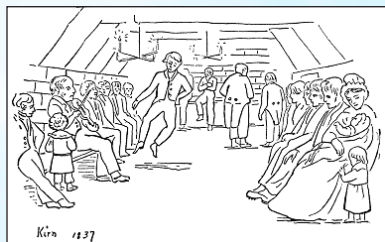
spiral down into the sun. So...this 'medium' must have no shear strength. So...light cannot possibly be a wave! These problems were not solved in Maxwell's lifetime.

To make great discoveries, a true genius must choose which information to use. Those who make the wrong choice are guilty of 'Confirmation Bias' and fail. Those who make the right choice, well, that is what Maxwell did.

Of course, today, we view light as having both wave- and particle-like properties. And as for the Luminiferous Aether, it is simply unneeded.

A rich source of information on Maxwell's youth is a reprint of the definitive 1882 biography, "The Life of James Clerk Maxwell (Illustrated)" available on Amazon. An amazing museum of Maxwell is

housed in his birth home in Edinburgh, Scotland, Welcome to the James Clerk Maxwell Foundation. Finally, put a visit to Glenlair, Maxwell's country estate, on your bucket list. Recently restored and preserved, about two hours by car from Edinburgh, Glenlair, The Maxwell at Glenlair Trust, it is a richly rewarding journey.



For more information:

www.amazon.com/Life-James-Clerk-Maxwell-Illustrated/dp/B0858TPFYF

www.clerkmaxwellfoundation.org/

www.glenlair.org.uk/