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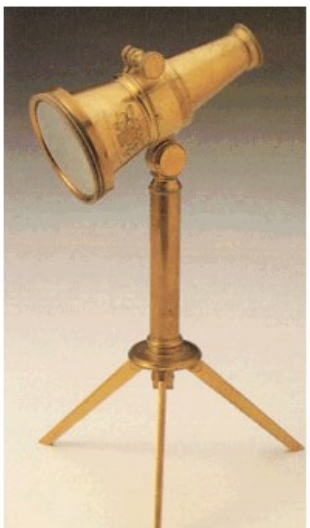
Sir David Brewster
(11 December 1781 – 10 February 1868)

Reflective symmetry has been observed since ancient times. Legend claims that early Egyptians would place two or three slabs of highly polished limestone together at different angles and watch with fascination as mandalas were formed by human dancers. It was not until centuries later, however, that this optical phenomenon was encased in one small tube and given a name. The kaleidoscope was invented in 1816 by Sir David Brewster. He was a man with as many facets as his invention. Whether delving into scientific research, religion, philosophy, education, optics, photography, writing, inventions, or life on other planets, Sir David pursued each endeavor with incredible energy.

David Brewster was born in Jedburgh, an obscure country town in the midst of the Scottish lowlands, on December 11, 1781. He was recognized as a child prodigy, and constructed a telescope when only ten years old. This would prove indicative of the chief bent of Brewster's work and genius. Nature endowed him with some of its choice gifts: dose observation, unceasing inquiry, and a scientific proclivity. Far before his peers, he absorbed all that was available in elementary Scottish education. Because he evidenced an exceptional aptitude for learning, his family decided that he should study for the ministry of the Church of Scotland. Thus, at the tender age of 12, he was consigned to the University of Edinburgh, where he continued his intellectual achievements. He was greatly admired at the university for his unusual academic ability, and was generously welcomed into the intimate fellowship of the distinguished professors of philosophy and mathematics.

The zenith of his formal education was reached at age 19 when he was awarded an honorary Master of Arts degree. This carried with it a license to preach the gospel as a minister of the Scottish Established Church. This was in the year 1801, and Brewster immediately turned his great talents to two of his life-long interests, the study of optics and the development of scientific instruments. For twelve years he conducted a series of experiments that were revealed to the public in A Treatise Upon New Philosophical Instruments, published in 1813.

Brewster's treatise did not represent his only accomplishments during this period. In 1807, at the age of 26, the University of Aberdeen awarded him a Doctor of Letters degree, the highest literary distinction of that era and a truly unique achievement for one of his age. But this was not all-in 1808, he was elected a Fellow of the Royal Society of Edinburgh, and the same year became editor of the Edinburgh Encyclopedia, a position he distinguished with excellence for more than 20 years.

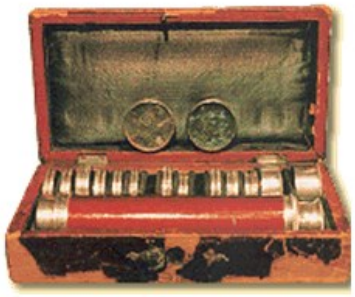


In 1810, Brewster married Juliet McPherson. Their marriage, which produced four sons and one daughter, was apparently a happy one, lasting forty years until Juliet's death. and possessed a great personal charm when he chose to exercise it."

It was in 1811, while writing an article on "Burning Instruments," Brewster investigated Buffon's Needle theory (considered to be the first problem in geometric probability). Brewster did not consider Buffon's proposal practical. However, it sparked an idea that produced awesome scientific results. In the course of his investigation he constructed a lens of great diameter out of one piece of glass by cutting out the central parts in successive ridges like stair steps. Thus was born an apparatus of then-unequaled power-the polyzonal lens-a lens constructed by building it on several circular segments.

This useful discovery, which created light-stabs of brilliance that could pierce far into the night, was later perfected and named after French physicist A. Fresnel, and resulted in the lighthouse as we know it today. This breakthrough was followed by yet other honors.

Brewster was admitted to the Royal Society of London, and was later awarded the Rumford gold and silver medal for his theory on the polarization of light. Ambient light, which comprises most of the light we encounter every day, is a collection of light waves vibrating in all directions. When light is reflected or it passes through certain materials, the waves tend to vibrate in a single direction. Light that vibrates in this more orderly fashion is polarized. Brewster discovered a simple way to calculate the angle at which light must strike a substance for maximum polarization. Brewster's Angle is useful in all kinds of practical applications, from adjusting radio signals to building microscopes capable of examining objects on a molecular scale. It is central to the development of fiber optics, lasers, and to the study of meteorology, cosmology, and material in 1816, the Institute of France science. Success followed success, and in 1816, the Institute of France adjudged him 3,000 francs - half the prizes given that year for the two important scientific discoveries made in the two previous years.



Then, as an added jewel to his already glittering optics crown, Brewster invented the kaleidoscope! It was 1816, and Brewster, at 35, was already an established philosopher, writer, scientist, and inventor. His kaleidoscope created unprecedented clamor. Dr. Peter M. Roget (whose illustrious Thesaurus, established in 1834, continues to be the most valued writer's tool next to the dictionary) paid tribute to his friend Sir David's invention in Blackwood's Magazine in 1818: "In the memory of man, no invention, and no work, whether addressed to the imagination or to the understanding, ever produced such an effect."

A universal mania for the instrument seized all classes, from the lowest to the highest, from the most ignorant to the most learned, and every person not only felt, but expressed the feeling that a new pleasure had been added to their existence. While Brewster was granted a patent for his kaleidoscope, as well as acknowledgment and acclaim for his invention, he did not realize any remuneration.

In 1823, the Institute of France elected Brewster a corresponding member. The Royal Academies of Russia, Prussia, Sweden, and Denmark each conferred on him the highest distinctions accorded a foreigner. These high honors opened lines of communication for him with the great minds of Europe. In midlife, in 1832, he was knighted by William IV, instantaneously acquiring a social status known only by those few touched by the king. However, Brewster simply continued to pursue his investigations and experiments.

One of Brewster's most illustrious moments came in 1849. He was nominated as one of a panel of eight foreign associates to the National Institute of France. So great were Brewster's achievements in comparison to all others that, after examination, the institute struck the names of all other candidates and Sir David Brewster stood in splendid isolation as the sole remaining candidate. His discoveries of the physical laws of metallic reflection and light absorption, the optical properties of crystals, and the law of the angle of polarization, along with his improvement of the stereoscope and lighthouse apparatus, surpassed most scientific achievements of that era.

Brewster's contributions to philosophy and science earned him honors and accolades from his peers, but it was by his pen that he earned his living. Among his most noteworthy books are two major treatises on the kaleidoscope (one written in 1816, and a revised edition in 1858); two separate biographies on the life of Sir Isaac Newton; A Treatise on New Philosophical Instruments; Martyrs Of Science: or the Laws of Galieo, Tycho Brahe, and Kepler; Letters on Natural Magic Addressed to Sir Walter Scott; A Treatise on Optics; and More Worlds Than One.

There is no doubt that Brewster would be surprised and perhaps disillusioned to find that his most enduring legacy is the kaleidoscope. His achievements and contributions to the world of science, and to the social and cultural history of the era, actually covered a much broader spectrum, as did his numerous inventions, including the lenticular stereoscope, binocular camera, polyzonal lens, polarimeter, and lighthouse illuminator.