Ernst Florenz Friedrich Chladni Biography

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Biography

As a musician, Ernst Chladni was fascinated by **acoustics** and vibrations. Travelling throughout Europe, he demonstrated the patterns of vibrations that were produced when fine powder or sand was spread on glass plates of various shapes and sizes and a violin bow was run over the edges of the plates. Visible lines, called **nodes**, appeared at the motionless points where the powder collected, forming patterns with bilateral symmetry. The opposite sides of each line corresponded to opposing vibratory motions.

Chladni was born in Wittenberg, Germany, in 1756, the son of Ernst Martin and Johanna Sophia Chladni. His father was a jurist who forced his son to study for the law and Chladni earned his degree from the University of Leipzig in 1782. However, as soon as his father died, Chladni turned his attention to scientific investigations. Earlier scientists had explained the vibrations of strings, but vibrations on solid plates had never been examined. By classifying the shapes and identifying the corresponding pitch, Chladni demonstrated how the patterns and sounds of the plates corresponded to the **harmonics** of strings.

On his tours, Chladni performed on the keyboard instruments he had invented, types of glass harmonicas called the "euphonium" and the "clavicylinder." When not travelling, Chladni resided in Wittenberg, where he conducted experiments and wrote treatises on acoustics. His early work on vibrating plates was published in 1787. Chladni also studied the vibrations of various types of rods and measured **sound velocity** in solid rods. To measure sound velocity in gases, Chladni compared the pitch of wind instruments filled with air or with another gas. He demonstrated the existence of longitudinal **waves** that were discordant with common transverse waves and he showed how a chime should be supported and struck, so as not to excite the discordant waves. He also studied meteorites, suggesting that they came from outer **space**. Chladni died in Breslau, Germany, in 1827.

Chladni's vibrating figures inspired major research efforts into **elasticity** and acoustics. After his demonstration before Napoleon and an audience of scientists at the Paris Academy in 1808, the academy offered a prize for the best mathematical analysis of the plates. In 1816, the French mathematician Sophie Germain was awarded the prize for her differential equation that could predict the patterns formed on Chladni's plates.