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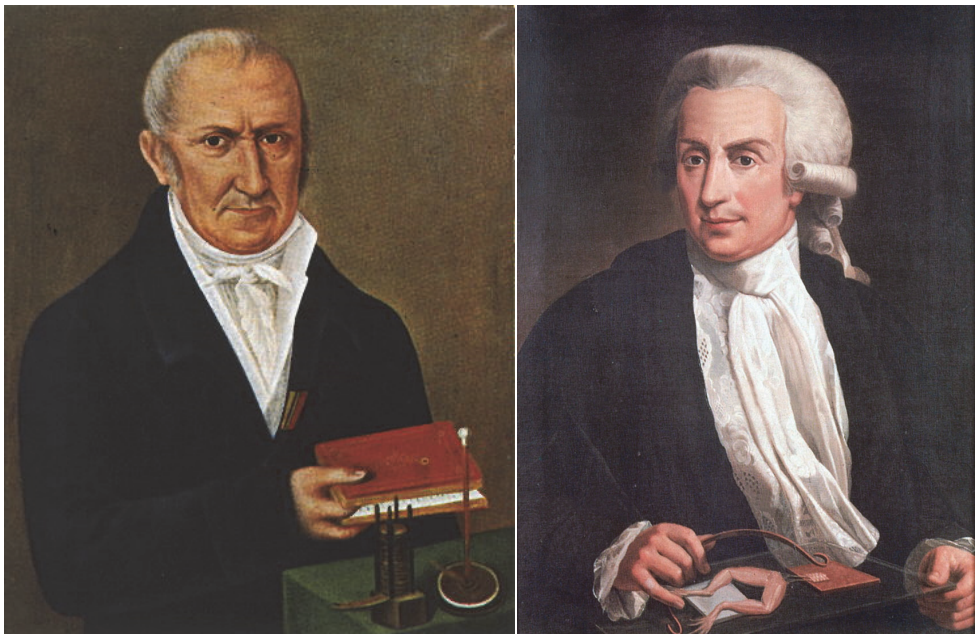
The birth of electrochemistry: building a simple voltaic pile

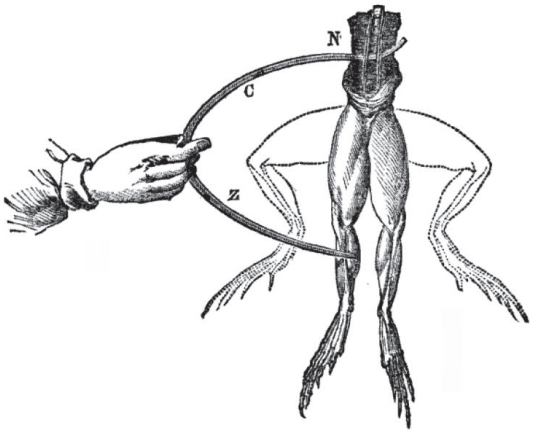
Galvani and Volta: the great debate



Battling giants: Alessandro Volta (left) and Luigi Galvani (right).

Images: A. Volta: Tohma/Wikipedia, Public Domain. L. Galvani: Ctac/Wikipedia, PublicDomain

Galvani and Volta were both observing the same natural phenomenon – electrical activity in living organisms – but from distinct philosophical and theoretical frameworks. Galvani, rooted in his Catholic beliefs, proposed that the spark of life came from a divine source, considering electricity as a vital force granted by God. His observations of muscle contractions and electrical responses in animal tissues led him to conclude that electricity was a vital, innate property of living beings.



Galvani's famous experiment: electrodes touch a frog, and the legs twitch into the upward position

Image: JohnBad/Wikipedia, Public Domain

On the other hand, Volta's viewpoint was shaped by the Enlightenment thinking, emphasizing reason, experimentation, and a mechanistic worldview. Volta proposed that electricity could be generated by artificial means – outside the organism – through human invention. This was revolutionary at the time, as it aligned with the idea that humans could harness and control natural forces through technology; this concept was central to the enlightenment vision of progress and innovation.

Volta battery at the TempioVoltiano museum, Como

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Notably, Galvani refused to swear allegiance to Napoleon, and as a consequence, he was stripped of his position as a professor at the University of Bologna. The death of Galvani in 1798 ended his ability to further explore his ideas experimentally, while Volta's success in creating the voltaic pile (a type of early electric battery) solidified his position in the scientific debate. During the 19th century, Volta's model was broadly accepted as the prevailing explanation, marking him as the 'winner' of the debate. However, scientific understanding of electricity took another turn in the 20th century. It was discovered that the human body itself was capable of generating its own electrical potentials; these are now used for modern medical diagnostics. Techniques such as electroencephalography and electrocardiography rely on the ability to measure these natural electrical signals produced by the body. This modern discovery illustrates that both perspectives – Galvani's emphasis on the vital role of biological systems and Volta's focus on external, artificial electrical generation – contain elements of truth and have contributed to our understanding of electricity and its role in biology.