Packed with Power

The development of the battery reflected the currents of the time

> Most of us don't think twice when popping a few AAA batteries into our flashlights, TV remotes and clocks. Our only expectation is that they keep the devices going and going and going—just as promised by the iconic bunny rabbit in the popular television commercials.

But like many things we take for granted in our modern lives, the battery has a fascinating history—a history that describes the development of electrochemical cells, which were crucial for industrial applications of electricity. Until the advent of electrical generators and electrical power grids in the late 19th century, people depended on batteries as the main source of electricity.

Many credit Italian Alessandro Volta with inventing the first battery in the late 1700s—but an archaeological discovery, made in what today is Iraq, puts that into question. In 1936, railroad workers dug up a clay jar, which held an iron rod surrounded by a copper cylinder. The object puzzled the finders. In 1938, German archaeologist Wilhelm Konig suggested that this device, if suffused in an electrolytic food acid like vinegar or lemon juice, could have been an early battery. Subsequent experiments showed that the "Baghdad Battery," dating back 2,000 years, would have been capable of generating 1.1 to 2 volts of electricity.

Fast forward 1,600 years and thousands of miles west, where a number of ingenious European and American inventors were hard at work on the problem of generating and transmitting electricity. Enter the aforementioned Alessandro Volta, of Milan, Italy. In 1800, Volta discovered that some fluids could conduct electricity. After much trial and error, he learned that he could generate even more power by stacking pairs of copper and zinc disks on top of each other, separated by brine-soaked cloth or pasteboard (the electrolyte), in a "voltaic pile." When the plates were connected by wire, they produced electricity. Volta proudly presented this breakthrough at the prestigious Royal Academy of London and published the results, making him famous. Today we use the term "volts" to describe the strength of a battery.

Volta's battery was the first to emit a steady, lasting current, but it didn't last for long and there were other drawbacks: The metal disks corroded quickly, and the height of the voltaic stack was limited. England's John Frederich Daniell solved that problem with his "Daniell Cell": a jar half filled with copper sulfate solution, with a copper plate at the bottom. A zinc plate was hung at the jar's top and zinc sulfate solution was added, which, being lighter, floated to the top and surrounded the zinc plate. A wire connected to the zinc plate represented the negative terminal, while a wire leading from the copper plate was the positive terminal. This worked well enough to power the telegraph and other stationary 19th-century electrical inventions. But even the Daniell Cell had its shortcomings, including that it was not rechargeable.

Swedish scientist Waldemar Jungner addressed this issue in 1899 by inventing the first nickel-cadmium rechargeable battery. Unfortunately, cadmium was expensive, so famed American inventor Thomas Edison replaced it with less pricey iron. This may have been an example of the axiom "You get what you pay for" because the Edison battery didn't perform very well. German scientists Schlecht and Ackerman overcame such problems by inventing something called the "sintered pole plate," which carried larger currents longer.

The nickel-cadmium battery was used for many years, and for many purposes. (Duracell, a company whose name is recognizable today, began operating in 1964.) In the 1970s, the first lithium batteries came into use, but they had the disadvantage of being nonrechargeable. (Lithium metal is inherently unstable.) Efforts to create a rechargeable version failed, and research moved to a lithium-ion combination, with the Sony Corporation commercializing the first lithium-ion battery.

Today, there are a variety of compact batteries of various types—alkaline, lithium, carbon zinc, silver oxide and more—for different uses. These handy devices power many of our modern-day conveniences, from hearing aids to cellular telephones to digital cameras.