VIGYAN 2047 Volume 1 No. 2 November 2024 Pages 34–35

From the Archives of Science & Technology

November Edition

We bring to you a regular column that takes you through the annals of science and technology with a curated selection of significant events and breakthroughs. From groundbreaking discoveries to transformative innovations, join us as we explore the pivotal moments that have shaped our world and continue to inspire future advancements.

The Strait of Magellan

The Strait of Magellan (Spanish: Estrecho de Magallanes), also known as the Straits of Magellan, is a navigable sea route in southern Chile that separates mainland South America to the north from Tierra del Fuego to the south. It is regarded as the most significant natural passage between the Atlantic and Pacific Oceans. The strait is approximately 570 km (310 nautical miles; 350 mi) long and 2 km (1.1 nautical miles; 1.2 mi) wide at its narrowest point. In 1520, the Spanish expedition led by the Portuguese navigator Ferdinand Magellan, after whom the strait is named, became the first Europeans to discover it. Magellan originally named the strait Estrecho de Todos los Santos ("Strait of All Saints"). However, the King of Spain, Emperor Charles V, who sponsored the Magellan-Elcano expedition, later renamed it in honor of Magellan. Navigating the strait can be challenging due to its frequent narrows and unpredictable winds and currents, making maritime piloting compulsory. Compared to the Drake Passage–a notoriously stormy route around Cape Horn, often plagued by gale-force winds and icebergs–the Strait of Magellan is shorter and more sheltered. Along with the Beagle Channel, it was one of the few sea routes connecting the Atlantic and Pacific before the construction of the Panama Canal.

Discovery of x-ray

November 8 is World Radiography Day, celebrating Wilhelm Röntgen's discovery of X-rays, or "a new kind of invisible light." He accidentally discovered X-rays while experimenting with fluorescence in Crookes cathode tubes, noting that rays passed through shielding to create images on light-sensitive paper. On November 8, 1895, he famously captured an image of his wife's hand. X-ray technology revolutionized medicine by enabling non-invasive visualization of the body, improving diagnosis and treatment planning. Röntgen's discovery was quickly accepted in the medical field. In a notable 1898 photograph, Dr. William Gray uses an unshielded X-ray tube aboard the USAHS Relief off Cuba, illustrating its military significance. The New York Times reported that the X-ray had become essential for military surgeons. The Crookes tube, named after William Crookes, is an early glass vessel used to study electrical charges in a vacuum. Johann Hittorf noted in 1869 that electrical charge traveled in a straight line between the cathode and anode, coining the term "cathode rays." Röntgen's work showed that these tubes produced both visible fluorescence and the invisible radiation we now call X-rays.

Darmstadtium discovery

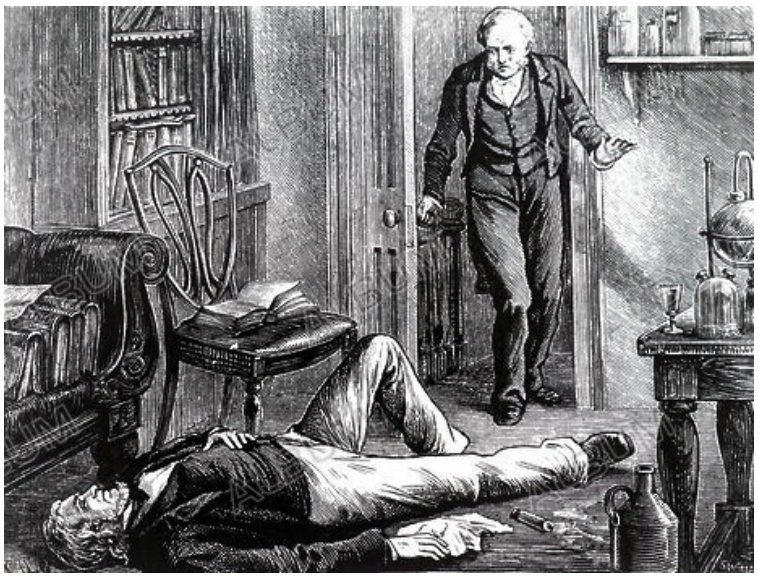
Darmstadtium is a synthetic chemical element with the symbol Ds and atomic number 110. Highly radioactive, its most stable isotope, darmstadtium-281, has a half-life of about 14 seconds. It was first created on November 9, 1994, by the GSI Helmholtz Centre for Heavy Ion Research in Darmstadt, Germany, from which it takes its name. In the periodic table, darmstadtium is classified as a d-block transactinide element in the 7th period and group 10. Although no chemical experiments have confirmed its behavior as the heavier homologue of platinum, it is expected to share properties with lighter homologues like nickel, palladium, and platinum. The discovery involved bombarding a lead-208 target with accelerated nickel-62 nuclei, resulting in the detection of a single atom of the isotope darmstadtium-269.

$$^{208}_{82}\mathrm{Pb} + ^{62}_{28}\mathrm{Ni} \rightarrow ^{269}_{110}\mathrm{Ds} + ^{1}_{0}\mathrm{n}$$

Two additional atoms were detected on November 12 and 17. A supposed discovery of another atom on November 11 was later found to be based on fabricated data by Victor Ninov and was subsequently retracted. In the same series of experiments, the team also conducted reactions using heavier nickel-64 ions. During two runs, they convincingly detected 9 atoms of darmstadtium-271 through correlation with known daughter decay properties:

$$^{208}_{82}\mathrm{Pb} + ^{64}_{28}\mathrm{Ni} \rightarrow ^{271}_{110}\mathrm{Ds} + ^{1}_{0}\mathrm{n}$$

Before the successful synthesis of darmstadtium, there were attempts in 1986–87 at the Joint Institute for Nuclear Research in Dubna and in 1990 at GSI. A 1995 effort at the Lawrence Berkeley National Laboratory hinted at the isotope darmstadtium-267, while a 1994 attempt at JINR suggested darmstadtium-273. Each team proposed names for element 110: the American team suggested "hahnium," the Russian team proposed "becquerelium," and the German team recommended "darmstadtium." In 2001, the IUPAC/IUPAP Joint Working Party recognized the GSI team as the discoverers, allowing them to propose the name.



The first use of chloroform

Sir James Young Simpson (1811-1870) was the first to use chloroform as an anesthetic in 1847. An obstetrician and professor at the University of Edinburgh, Simpson sought a more effective anesthetic than ether. On November 4, 1847, he and his assistants inhaled chloroform, experiencing an immediate loss of consciousness. They quickly recognized its potential as a powerful sedative and painkiller. Simpson introduced chloroform into obstetric and surgical practice at the Royal Infirmary on November 8, 1847. He documented his findings in a paper titled Account of a New Anesthetic Agent, Substitute for Sulphuric Ether in Surgery and Midwifery. Chloroform soon gained popularity for use in surgery and dental procedures, notably being administered to Queen Victoria during the birth of Prince Leopold in 1853. Chloroform remained in use well into the twentieth century, establishing Simpson as a pioneering figure in the field of anesthesia. His discovery revolutionized surgical practices in the nineteenth century.