

NICHOLAS CALLAN – PRIEST SCIENTIST AT MAYNOOTH

By

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Nicholas Joseph Callan was Professor of Natural Philosophy (now called Physics) at St. Patrick's College, Maynooth, from 1826 until his death in 1864. He was a pioneering scientist in the field of electrical science. Unfortunately his inventions were subsequently attributed to other scientists and his great work is only now starting to get recognition.

Callan was born in 1799 at Darver, Co. Louth, into a well-to-do family of farmers. After early education at Dundalk Academy he entered the National Seminary at Maynooth in 1816. During his third year there he studied physics under Dr. Cornelius Denvir and developed a special interest in electricity and magnetism.

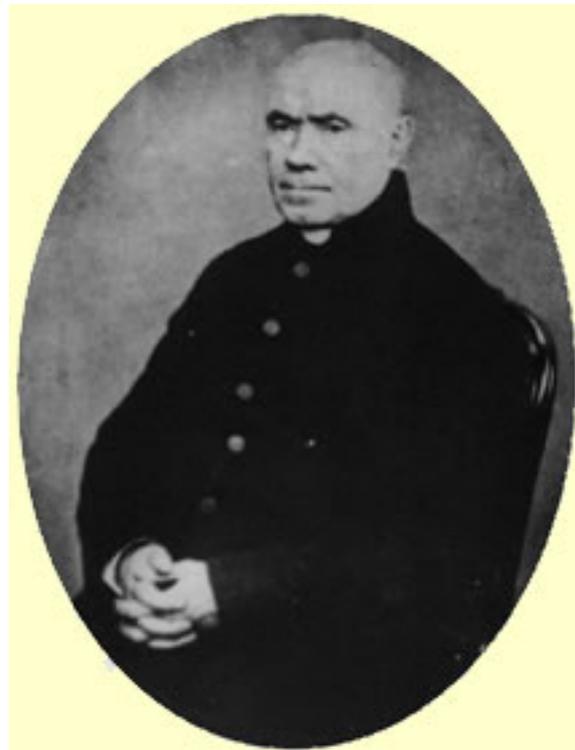
Callan was ordained a priest in 1823 and went to Rome to study at Sapienza University, obtaining a doctorate in divinity in 1826. While in Rome he became acquainted with the work of the pioneers in electricity, Luigi Galvani (1737-1798) and Alessandro Volta (1745-1827). When Dr. Denvir resigned Callan was appointed to the chair at Maynooth in 1826.

Callan began to work intensively on electricity, helped by funding from family and friends. His main claim to fame is the invention of the induction coil, a device for producing high voltage currents and the forerunner of the step-up transformer, an essential device in the modern world of limitless electrical supply.

In 1831 Michael Faraday discovered electromagnetic induction which basically means that a changing magnetic field can induce an electrical current to flow in a strip of wire. Also in 1825, William Sturgeon invented the electromagnet. In this device, wire is wrapped around a soft iron core. Electrical current is passed through the wire, which strongly magnetises the iron core.

Callan combined these two ideas together to produce his first induction coil in 1836. He wound two coils of wire, one connected to a low voltage battery, around an iron core. He discovered that when the current through the primary coil was interrupted a high voltage current was produced in the unconnected secondary coil. Sparks issued between the two ends of the secondary coil of wire. Callan noted that the faster he interrupted the current, the bigger the spark. In 1837 he produced a giant induction machine. He used a mechanism from a clock to interrupt the current 20 times a second. The machine generated 15-inch sparks and an estimated 60,000 volts - the largest bolt of artificial electricity ever seen at the time.

Callan needed reliable batteries and he carried out pioneering work on the development of batteries. Batteries contain positive and negative plates. Prior to Callan's improvements batteries used expensive platinum or unsatisfactory carbon for one plate and zinc for the other. He showed you could use inexpensive cast-iron instead of platinum or carbon.



Nicholas Joseph Callan

Callan invented the 'Maynooth' battery in 1854 and the single fluid cell in 1855. In the Maynooth

battery the outer casing was made of cast iron and the zinc plate was immersed in a porous pot in the centre. The Maynooth battery went into commercial production in London.

Callan would connect large numbers of batteries together and once connected 577 together to make the world's largest battery. There were no instruments available to measure voltage or current, so Callan measured the power of his batteries by the weight they could lift when powering an electromagnet. His best effort lifted 2 tons.

Callan's batteries produced very high voltages when connected to his experimental coils of wire. Those coils could give large electrical shocks and Callan used this as another way of testing battery power. He persuaded his students to take shocks from the coils and he gauged the power of the battery from their reactions. One student named William Walsh, who later became Archbishop of Dublin, was rendered unconscious by a shock. The College authorities asked Callan to be more careful with his students, so he switched over to electrocuting turkeys.

In 1838 Callan stumbled on the principle of the self-exciting dynamo. He found that by moving an electromagnet in Earth's magnetic field he could produce electricity without a battery. Callan also discovered an early form of galvanisation to protect iron from rusting when he was experimenting on battery design, and he patented the idea.

Callan also constructed electric motors and in 1837 he built a small motor to drive a trolley around his lab. He proposed using battery powered locomotives on the new railways and, with great foresight, predicted electric light.

The Third Earl of Rosse, who built the giant telescope at Birr, was a member of the Board of Visitors to Maynooth College. Callan visited Birr to view the telescope, but, for some reason, he was not admitted. When later the Third Earl came to Maynooth to see the induction coil, Callan suggested that the lord should return to Birr and view the coil through his telescope.

Callan's invention of the induction coil was attributed to the German instrument-maker Heinrich Ruhmkorff (1803-1877). Callan was largely forgotten by the wider world of science mainly because Maynooth was a theological university and science had a low status on the curriculum. Callan's pioneering work was easily forgotten after his death in such a setting.

In 1936 Professor P.J. McLaughlin published his researches into Callan's publications and proved that Callan invented the induction coil. This was officially acknowledged by the world of physics in 1953.

Callan died of natural causes at Maynooth in 1864. Today the College Museum at NUI Maynooth holds a remarkable collection of old scientific instruments, including many items from Callan's laboratory.

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