William Withering was a major medical figure in eighteenth-century Britain, who pioneered the application of the scientific method to medicine. He observed carefully, recorded evidence precisely and drew conclusions from these facts. Best known for his work on the medical value of the foxglove plant, he also made important contributions to the study of botany and mineralogy.

**Early Life**

William Withering was born in 1741 during the reign of George II in the market town of Wellington, Shropshire. His father Edmund was an apothecary there, and his mother Sarah was the sister of Dr Brooke Hector, a prominent physician in Lichfield. William was privately educated by the Reverend Henry Wood of Ercall. We know little of his childhood, but some facts can be gleaned from the memoir written by his son.

He studied medicine in Edinburgh and graduated in 1766 and his thesis, in Latin, was on the subject of the malignant putrid sore throat. His first professional appointment was as physician to the Stafford Infirmary. During this period, he was not overly busy, was able to indulge in amateur dramatics and met Helena Cookes, his future wife, who cultivated his interest in botany.

**The Foxglove**

Whilst at Stafford, he was informed by Erasmus Darwin, a prominent physician at Lichfield that a vacancy as physician in Birmingham had arisen after the death of William Small. The existing senior physician at the General Hospital was John Ash. Withering took up the post in 1775 and was soon much in demand. However, he felt a loyalty to the good folk of Stafford, so paid monthly visits there for a while. On one such occasion, whilst carriage horses were being changed, he was asked to see a seriously ill patient apparently dying of the dropsy (an excess of accumulated body fluid, manifest as large swelling of the legs). He had no new ideas as to what to suggest as everything he knew had been tried. On a later visit to Stafford, he enquired as to the fate of the patient. Expecting to be given bad news, he was surprised to be told that the patient had been restored to health, as a consequence of a remedy ascribed to an old Shropshire woman.
Withering was shown the list of ingredients, all well-known to him, and not thought likely to have been of any value. However, one which aroused his curiosity was the foxglove leaf, the effect of which he could not discount. He embarked on a study of its value, and eventually reported the results, both positive and negative, in 156 cases seen between 1775 and 1784. He learned from his experiences, and formulated a careful description of side effects, of which there were many.

The following year, 1785, Withering published his most famous work, *An Account of the Foxglove*, on the basis of which he was elected a Fellow of the Royal Society. Because the drug had, and still has, a very narrow window of safety, other users questioned its usefulness. When he saw the excessively high doses they were using, he was scathing in his comments. His description of the side effects and observations about how to extract benefit whilst avoiding undue side effects is an example of painstaking experiment and conclusions that would even today be scientifically acceptable. In 1779, he published an *Account of the Scarlet Fever*, as documented in Birmingham. An epidemic had appeared in 1778, and rapidly spread to towns and villages around.

**William Withering and Erasmus and Robert Darwin**

Withering’s interest in botany was stimulated by his future wife, and in 1776 he published *Botanical arrangement of all the vegetables naturally growing in Great Britain*. This ran to several editions, with his son, also named William, as author after his father’s death. This was the start of Withering senior’s rise to fame as a botanist and not surprisingly, he was elected to the Fellowship of the Linnean Society in 1789. His contribution was that of translation from Latin into English of the classification of the famous Swede, Carolus Linnaeus. However, he had a fierce rival, namely Erasmus Darwin who, circa 1785, also prepared a translation of Linnaeus’s classification, entitled *A system of vegetables, according to their classes, orders* – translated from the *Systema Vegetabilium of Linnaeus by a botanical society at Lichfield*. Darwin thanked thirty-three other botanists for their suggestions, but rudely dismissed Withering: ‘Dr Withering has given a Flora Anglica under the title of Botanical arrangements…but has entirely omitted the sexual distinctions, which are essential to the philosophy of the system; and has …rendered many parts of his work unintelligible to the Latin Botanist.’

The reason for this antipathy is unclear, but may relate to Withering’s comment in regard to case 4 of his 156 cases of patients treated with foxglove leaf. He, together with Darwin, had attended a sick old lady, and agreed to administer digitalis. Withering stated: ‘I have been more particular in the narrative of this case, partly because Dr Darwin has related it rather imperfectly, trusting, I imagine, to memory, and partly because it was a case which gave rise to a very general use of the medicine in that part of Shropshire.’
Erasmus Darwin’s son, Charles, whilst a medical student in Edinburgh, tragically died after being fatally infected, probably as a result of carrying out a post-mortem examination. A description of the same case was posthumously presented as part of Charles Darwin’s MD thesis, but was clearly written by Erasmus.

There were personality differences as well. Erasmus was a free thinker, not bound by religious precepts, particularly when it involved the opposite sex. Thus, the description of the intimate regions of flowers offered a great opportunity to indulge his fantasies, as he also did in his poem *The Loves of the Plants*. He probably thought Withering a bit of a prude. However, with this in mind, Withering subsequently published *An Arrangement of British Plants* (1787–92), intended to present to young British ladies the utility of the Linnaean classification system. In addition, this work introduced his specially designed field microscope which subsequently became known as the Withering botanical microscope. His reputation was furthered by the eminent Swedish chemist and naturalist, Torbern Bergman, who named a flowering plant of the Solanacea family, *Witheringia solanacea*.

In 1788 difficulties with the Darwin family intensified in the Houlston case. Withering was called, from Birmingham, to attend a sick lady, Mrs. Houlston, in Wellington. He visited and changed her treatment but did not know that Robert Darwin, Erasmus’s son, a physician in Shrewsbury, had shortly before seen her and prescribed his own treatment plan. Robert was enraged that a fellow physician had, without discussion, altered the existing treatment. There followed a correspondence between them, which went public within the profession.

**Mineralogy**

Withering was also interested in mineralogy, and the analysis of soils containing clay and calcium carbonate (marls), *Derbyshire toadstone*, and *Rowley ragstone*. He described barium carbonate which he differentiated from barium sulphate. Subsequently barium carbonate crystals were named *Witherite*. He kept meticulous records of temperature, atmospheric pressure and humidity in England and Portugal. In 1783, he travelled to Portugal because he thought it might improve his health as he had symptoms which he suspected were due to tuberculosis, and because no cure was known at that time, travel to a better climate was the best thing to do. Whilst visiting Portugal in 1793, he was requested by the Portuguese government to analyse the...
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waters of the hot sulphuretted springs at Caldas da Rainha. Having accomplished this, he was subsequently elected a Member of the Portuguese Academy of Science.

Politics and Culture
The French Revolution of 1789 was followed by considerable political unrest in Britain. In 1791 riots took place in Birmingham – the so-called Priestley Riots – and Withering’s house in Edgbaston was threatened with attack. By plying the mob with drink, he gained time to secrete his valuables in the nearby church. However, Joseph Priestley, who had identified what we now call oxygen and who lived in Fair Hill (modern-day Sparkbrook), was less fortunate as the mob burned his house down and the homes and meeting houses of religious dissenters were destroyed. Even though Withering played no political role, Edgbaston Hall was ransacked.

The Lunar Society was a learned network with no more than 14 members. It was so-called because its members usually met when there was a full moon which made the homeward journey easier. Founders included Matthew Boulton, a leading industrialist, at whose home in Soho, Birmingham, most meetings were held. Also included were Josiah Wedgwood, the famous pottery owner from Stoke (Etruria); James Watt whose fame arose from his development of the steam engine; Erasmus Darwin from Lichfield; and William Small, the acknowledged founder of the Lunar Society. Withering became a member after Small’s death.

Death and Reputation
In 1792, Withering was honoured by having his portrait painted by Carl von Breda, the original of which is in the National Museum of Fine Arts, in Stockholm. Ultimately, frequent chest symptoms, including the coughing up of blood, led to his death in 1799 shortly before his planned move to The Larches in Fair Hill. He was entombed in Edgbaston Old Church, where there is a memorial tablet.
The purple foxglove (*Digitalis purpurea*) which he employed is now known to contain the active ingredient *digitoxin*. About 150 years later, Sydney Smith, a scientific worker at the Wellcome Chemical works in Dartford, found that the active ingredient in *Digitalis lanata*, the woolly foxglove, was more active and safer than the extract from the purple foxglove. The active ingredient was named *digoxin*, and this drug is still in use today. It works particularly well for heart failure in the presence of a rapid irregular heart rhythm called atrial fibrillation. There is evidence that whilst not necessarily prolonging life, it enables patients to remain longer in their own homes. At the Medical School of the University of Birmingham, there has been a William Withering Chair in Medicine since 1948.

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Further Reading

W. Withering, jun., *The miscellaneous tracts of the late William Withering M.D. F.R.S., including a memoir of his life, character, and writings* (1822).


