WILLIAM WITHERING*

BY

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From the Birmingham General Hospital

William Withering was descended from a long line of yeoman farmers who lived in the parish of Checkley in Staffordshire. An ancestor had married an heiress from Chipnall in Shropshire and had migrated in the reign of Charles I, but Edmund Withering, who practised as an apothecary at Wellington from 1738 to 1769, was the first instance of any medical association in the family. He married the sister of Dr. Brooke Hector of Lichfield, and his son William was born in 1741. William was destined for the profession of medicine from his earliest days; he was educated at home, apprenticed to his father, and went to Edinburgh as a student at the age of 21 years. Edinburgh was a great medical school even then, with upwards of 200 students in each year, but only a small proportion took the M.D. degree. At Edinburgh Withering learned to play various musical instruments and golf; he became a proficient draughtsman and a fluent speaker and writer. He wrote his M.D. thesis on malignant putrid sore throat and took his degree in July, 1766. In Edinburgh he made a number of lifelong friends and acquired a scientific outlook which enabled him to distinguish himself in chemistry, in botany, and in medicine.

Early in 1767 he settled in practice in Stafford, was appointed physician to the recently established Stafford Infirmary, and made a new set of friends. In November, 1769, his father, Edmund, died and left him all his freehold property subject to annuities to his mother and sisters, and three years later he married and began to feel that his professional income was inadequate, for he never made £100 a year while in Stafford. It was there that he wrote his botanical arrangement, a carefully prepared detailed work in English for English students, based on the Linnæan system. In the preface to the first edition of the botany he wrote, "The author will thankfully receive any communication that can tend to render this book more perfect and in case the public ever call for a second edition such new facts or observations as occur shall be inserted with suitable acknowledgements."

He also wrote, "Many people will be surprised to find so little said upon the medicinal virtues of plants, but those who are best enabled to judge of this matter will perhaps think that the greater part of that little might well have been omitted. . . . The dreadful apprehension that men formerly entertained of poisons made them fearful of employing substances that were capable of doing mischief, and they therefore rejected those that were most likely to do good. . . . We shall sooner attain the end proposed if we take up the subject as altogether new, and, rejecting the fables of the ancient herbalist, build only upon the basis of accurate and well considered experiments."

It is difficult to compare Withering's book with its contemporaries: it was better written than most and outlasted all. Withering himself produced three editions, with great industry during ill health and busy practice, his son edited a further four, and the final edition, the fourteenth, appeared in 1877, one hundred and one years after the original publication.

In February 1775 Dr. William Small of Birmingham died, and Dr. Erasmus Darwin wrote to

"Dr. William Withering, Physician at Stafford

"from Lichfield on 25th February, 1775

"DEAR DOCTOR,

I am at this moment returning from a melancholy scene, the death of a friend who was most dear to me, Dr. Small of Birmingham, whose strength of reasoning, quickness of intellect, learning

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in the discoveries of other men, and integrity of heart (which is worth them all) had no equal. Mr. Boulton suffers an inconceivable loss from the doctor's mechanical as well as medical ability. . . . Now it occurred to me that if you should choose that situation your philosophical taste would give you the friendship of Mr. Boulton which would operate all that for you which it did for Dr. Small. I saw by his papers that he gained about £500 a year at an average. . . . I shall not mention having wrote this letter to you but shall be glad of a line in answer, and please put private on the internal cover.

Adieu,
E. DARWIN "

FIG. 1.—The General Hospital near Birmingham. Opened in 1779, the physicians being Dr. John Ash, Dr. William Withering, Dr. Smith, and Dr. Edward Johnston.

So Withering came to Birmingham in May 1775, lodged with Mr. Wheeley at No. 10, The Square, and took over Dr. Small's consulting-room at No. 9, Temple Row. But each week he drove back to Stafford to see his patients at the Infirmary—30 miles each way. Withering was only 34, yet he had attracted Dr. Darwin's notice; perhaps he met him while staying in Lichfield with his uncle Dr. Brooke Hector.

Before the establishment of a hospital in Birmingham the physicians used to see at their consulting-rooms without fee the sick poor of the city for one or two hours a day. Dr. Small had done this; Dr. Withering continued the practice and saw between two and three thousand persons a year. It was upon some of these that the digitalis was first tried.

In 1775 he was asked about a family receipt for the cure of the dropsy, and was told that it had been kept as a family secret for many years by an old Shropshire woman who had sometimes made

cures when more regular practitioners had failed. The medicine contained twenty different herbs and was said to produce vomiting and purging. Withering said that it was not difficult for one conversant in these subjects to perceive that the active plant could be none other than the foxglove. It is startling to learn that a botanist in 1775 knew enough pharmacology to detect the active ingredient in a herb tea. He tried it out on his free patients, and was especially encouraged when Dr. John Ash told him that Dr. Crawley, principal of Brazen Nose College, had been cured of a hydrops pectoris by digitalis root, but as a biennial plant is unlikely to have a uniformly active root Withering used the leaves and gathered them when the plant was in flower, because he found that they varied in dose if gathered at other seasons. Then he dried the leaf and found it was five times as potent as the fresh leaf. At first he used a decoction, but in order to obtain more accurate dosage turned to an infusion and finally preferred the dried leaf.

In 1785, after using the medicine for ten years, he published his *Account of the Foxglove*. It was a small book of 207 pages with a delightful coloured frontispiece from the Flora Londinensis. Withering recorded all the 163 cases in which he had prescribed the foxglove; letters from correspondents describe a further 55 cases. Dr. Cawley, brother of the late Principal of Braze Nose, wrote details of his brother's illness and treatment, and Withering calculated that each dose the Principal took had been at least twelve times what a strong man should have taken, and concluded that either Dr. Cawley was remarkably retentive of life or that the root must have been particularly inactive. "Shall we wonder," he wrote, "that patients refuse to repeat such a medicine and that practitioners tremble to prescribe it?" The book was printed by Miles Swinney of Birmingham and cost five shillings. The preface is interesting and shows his scientific approach to the question:

"After having been frequently urged to write upon this subject, and as often declined to do so, from apprehension of my own inability, I am at length compelled to take up my pen, however unqualified I may still feel myself for the task.

"The use of the Foxglove is getting abroad, and it is better the world should derive some instruction, however imperfect, from my experience, than that the lives of men should be hazarded by its unguarded exhibition, or that a medicine of so much efficiency should be condemned and rejected as dangerous and unmanageable.

"It is now about ten years since I first began to use this medicine. Experience and cautious attention gradually taught me how to use it. For the last two years I have not had occasion to alter the modes of management: but I am still far from thinking them perfect.

"It would have been an easy task to have given select cases, whose successful treatment would have spoken strongly in favour of the medicine, and perhaps been flattering to my own reputation. But Truth and Science would condemn the procedure. I have, therefore, mentioned every case in which I have prescribed the Foxglove, proper or improper, successful or otherwise. Such a conduct will lay me open to the censure of those who are disposed to censure, but it will meet the approbation of others, who are the best qualified to be judges.

"To the Surgeons and Apothecaries with whom I am connected in practice, both in this town and at a distance, I beg leave to make this public acknowledgement, for the assistance they so readily afforded me.

"The cases related from my own experience are generally written in the shortest form I could contrive, in order to save time and labour; but the cases communicated by other practitioners, are given in their own words. I must caution the reader, who is not a practitioner in physic, that no general deductions, decisive upon the failure or success of the medicine, can be drawn from the cases I now present to him. These cases must be considered as the most hopeless and deplorable that exist; for physicians are seldom consulted in chronic diseases, till the usual remedies have failed: and, indeed, for some years, whilst I was less expert in the management of the Digitalis, I seldom prescribed it, but when the failure of every other method compelled me to do it; so that upon the whole, the instances I am going to adduce, may truly be considered as cases lost to the common run of practice, and only snatched from destruction, by the efficiency of

the Digitalis; and this in so remarkable a manner, that, if the properties of that plant had not been discovered, by far the greater part of these patients must have died.

“There are men who will hardly admit of any thing which an author advances in support of a favourite medicine, and I allow they may have some cause for their hesitation; nor do I expect they will waive their usual modes of judging upon the present occasion. I could wish, therefore, that such readers would pass over what I have said, and attend only to the communications from correspondents, because they cannot be supposed to possess any unjust predilection in favour of the medicine: but I cannot advise them to this step, for I am certain they would then close the book, with much higher notions of the efficacy of the plant than they would have learnt from me. Not that I want faith in the discernment or in the veracity of my correspondents, for they are men of established reputation; but the cases they have sent me are, with some exceptions, too much selected. They are not upon this account less valuable in themselves, but they are not the proper premises from which to draw permanent conclusions. I wish the reader to keep in view, that it is not my intention merely to introduce a new diuretic to his acquaintance, but one which, though not infallible, I believe to be much more certain than any other in present use. After all, in spite of opinion prejudice, or error, TIME will fix the real value upon this discovery, and determine whether I have imposed upon myself and others, or contributed to the benefit of science and mankind.”

Birmingham.

1st July 1785.

Dr. Hope, Dr. Duncan, and other Edinburgh physicians had been told by Dr. Jonathan Stokes and Mr. Charles Darwin—eldest son of Erasmus Darwin—of the use of digitalis, but all gave too large doses. Withering's fourth case is important.

In June 1776 a married lady, between 40 and 50 years of age, was attacked by a severe cold shivering fit, succeeded by a fever, great pain in her left side, shortness of breath, perpetual cough, and after some days, copious expectoration:

“... on the 4th June Dr. Darwin (then resident at Lichfield) was called to her and gave her various medicines.

“On the 25th July I was desired to meet Dr. Darwin at the lady's house. I found her nearly in a state of suffocation; her pulse extremely weak and irregular, her breath very short and laborious, her countenance sunk, her arms of a leaden colour, clammy and cold. She could not lie down in bed and had neither strength nor appetite, but was extremely thirsty. Her stomach, legs, and thighs, were greatly swollen; her urine very small in quantity. She had experienced no relief from any means that had been used. In this situation I knew of nothing likely to avail us, except Digitalis: and accordingly I proposed the Digitalis to be tried; adding, that I sometimes had found it to succeed when other, even most judicious methods, had failed. Dr. Darwin very politely acceded immediately to my proposition, and, as he had never seen it given, left the preparation and the dose to my direction. The patient took five draughts, which made her very sick and acted very powerfully upon the kidneys, for within the first twenty-four hours she made upwards of eight quarters of water. The sense of fullness and oppression across her stomach was greatly diminished, her breath was eased, her pulse became more full and more regular, and the swellings of her legs subsided.

“It is now almost nine years since the Digitalis was first prescribed for this lady, and notwithstanding I have tried every preventive method I could devise, the dropsy still continued to recur at times; but is never allowed to increase so as to cause much distress, for she occasionally takes the infusion and relieves herself whenever she chooses. Since the first exhibition of that medicine, very small doses have been always found sufficient to promote the flow of urine. I have been more particular in the narrative of this case, partly because Dr. Darwin has related it rather imperfectly in the notes to his son's posthumous publication, 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.”

After enumerating all the cases Withering summarized his opinion of *Digitalis* under the heading *Effects, Rules and Cautions*.

“The Foxglove, when given in very large and quickly-repeated doses, occasions sickness, vomiting, purging, giddiness, confused vision, objects appearing green or yellow, increased secretion of urine, with frequent motions to part with it, and sometimes inability to retain it; slow pulse, even as slow as 35 in a minute, cold sweats, convulsions, syncope, death. (I am doubtful whether it does not sometimes excite a copious flow of saliva.)

“When given in a less violent manner, it produces most of these effects in a lower degree; and it is curious to observe that the sickness, with a certain dose of medicine, does not take place for many hours after its exhibition has been discontinued; that the flow of urine will often precede, sometimes accompany, frequently follow the sickness at the distance of some days, and not unfrequently be checked by it. Let the medicine, therefore, be given in the doses described:—let it be continued until it either acts on the kidneys, the stomach, the pulse, or the bowel; let it be stopped upon the first appearance of any one of these effects, and I will maintain that the patient will not suffer from its exhibition, nor the practitioner be disappointed in any reasonable expectation.

“If it purges, it seldom succeeds well.”

He then made a series of most important clinical observations under the title *Constitution of Patients*.

“Independent of the degree of disease, or of the strength or age of the patient, I have had occasion to remark, that there are certain constitutions favourable, and others unfavourable to the success of the *Digitalis*. From large experience, and attentive observation, I am pretty well enabled to decide ‘a priori’ upon this matter, and I wish to enable others to do the same: but I feel myself hardly equal to the undertaking. The following hints, however, aiding a degree of experience in others, may lead them to accomplish what I yet can describe but imperfectly.

“It seldom succeeds in men of great natural strength, of tense fibre, of warm skin, of florid complexion, or in those with a tight and cordy pulse.

“If the belly in ascites be tense, hard and circumscribed, or the limbs in anasarca solid and resisting, we have but little hope.

“On the contrary, if the pulse be feeble or intermitting, the countenance pale, the lips livid, the skin cold, the swollen belly soft and fluctuating, or the anasarcaous limbs readily pitting under the pressure of the finger, we may expect the diuretic effects to follow in a kindly manner. In cases which foil every attempt at relief, I have been aiming, for some time past, to make such a change in the constitution of the patient, as might give a chance of success to the *Digitalis*.”

In 1787 Withering was made a member—the first provincial member—of the London Medical Society (Fig. 2).

Withering was not only a botanist and a physician; he was a chemist of ability and accomplishment. In 1782 he presented a paper on the chemical analysis of the Ragstone and Toadstone to the Royal Society. Two years later he communicated his experiments and observations on *Terra Ponderosa* and recognized the carbonate of barium as distinct from barytes. He suggested that barium salts were a good test for sulphates or sulphuric acid.

In 1785 he translated Professor Bergman’s textbook on chemistry under the title of *Outlines of Mineralogy* for Mr. Matthew Boulton; many years before he had translated Professor Bergman’s book on water analysis into English. It was in 1793 while in Portugal that he analysed the famous Queensbath, a hot sulphur spring some 60 miles north of Lisbon, and this achievement was signaled by his election to the membership of the Portuguese Academy of Science. He made nitrate of

FIG. 2.—The diploma of the London Medical Society making Dr. William Withering a Member—the first provincial member—on September 20, 1787. Sent by Dr. J. C. Lettsom.

mercury so as to be able to give an exact dose in the treatment of syphilis, and no doubt he took a lively interest in the chemical discussions at the meetings of the Lunar Society.

Withering wrote long letters expounding chemical knowledge to Lady Catherine Wright, and discussed the decomposition of water and the principles of acidity with Priestley, the composition of urinary calculi and the treatment of pulmonary disease by the inhalation of gases. At a Lunar Society meeting he even read a poem on the life and death of Phlogiston: Priestley believed in the Phlogiston theory; Withering did not.

In 1786 he took a 14 years' lease of Edgbaston Hall, at the very large annual rental of two hundred and thirty seven pounds ten shillings, where he bred Alderneys and Newfoundland dogs and by skilled management made a profit on the estate. (A picture of the Hall appeared in this journal in volume II, page 299, in October 1940). In 1791 there were most serious riots in Birmingham in which many large houses were attacked and damaged or destroyed. Edgbaston Hall was attacked but was fortunate to escape serious damage. The disturbance was fomented by rival religious factions who distrusted Dr. Joseph Priestley and his friends for their outspoken approval of the French Revolution. It was at Edgbaston Hall that Withering entertained many of the leading scientists and botanists of his time, for he had a European reputation, and there too the Lunar Society met.

In the eighteenth century, when books were scarce and expensive and technical journals quite unknown, men of similar interests began to form societies for friendship and the interchange of ideas. The Royal Society in London was the best known and the earliest, but there were many provincial bodies with similar constitutions, and among these the Birmingham Lunar Society was the most brilliant. It was started about the year 1765 by Matthew Boulton, the great Birmingham industrialist, Erasmus Darwin, the scientific physician and botanical poet of Lichfield, and William Small, physician and consultant chemist to Matthew Boulton. The meetings were held each month at the houses of the various members to dine and discuss. They took their name because the meetings were held at the full moon so as to facilitate the drive home through the unlighted streets—important since Darwin and Wedgwood had long journeys to make. The Lunar Society kept no records and had neither a secretary nor minutes; it is, therefore, quite impossible to determine the names or dates of its various members or the subjects discussed. We know that chemical experiments, the weather, inventions of all sorts, conjuring demonstrations, and literary discussions had a place at the meetings, and that various mechanical developments were demonstrated from time to time and that many of its members became famous.

James Watt and Withering joined the society in 1775 after the death of Dr. Small, and Joseph Priestley became a member about 1780 when he came to Birmingham.

On April 5, 1778, Erasmus Darwin wrote:

“DEAR BOULTON,

I am sorry that the infernal divinities who visit mankind with diseases and are therefore at perpetual war with doctors should have prevented my seeing all your great men at Soho today. Lord! What inventions, what wit, what rhetoric metaphysical, mechanical and pyrotechnical will be on the wing, bandied like a shuttlecock from one to another of your troop of philosophers! While poor I, I by myself, imprisoned in a postchaise am joggled and jostled and bumped and bruised along the King's high-road, to make war upon a stomach-achè or a fever!”

James Watt was the engineer whose life interest was steam; he became Boulton's partner and a pioneer in the research into the composition of water.

Withering had a big practice; in 1780 he earned over 2000 guineas, travelling long distances through the Midlands and into Wales. In one year he travelled over 6000 miles. He had a carriage accident in 1781 and sustained a fractured collar-bone and some concussion, but continued his work, within four days driving out 20 miles to see an apothecary's wife.

It was in 1776, one year after he reached Birmingham, that he developed a curious fever. In

FIG. 3.—The Memorial Tablet erected to the memory of Dr. William Withering by his son. Designed by W. Hollins.

the spring he was seized with an irregular fever which lasted three weeks and prevented him from doing or even thinking of anything that could be avoided.

From this time slowly but steadily his physical health deteriorated and he suffered from repeated attacks of pneumonia, pleurisy, hæmoptysis, and fever. In time Withering recognized that he was the victim of a progressive disease—whether this was bronchiectasis or tuberculosis must remain uncertain. Boulton and Watt installed a ventilating system at Edgbaston Hall so as to maintain a constant temperature and humidity. In 1792 his health forced him to resign from the staff of the General Hospital, and he wintered in Portugal for two years but did not gain any great benefit from the experiment and preferred his air-conditioned home at Edgbaston, where he could continue his domestic employments—the third edition of the *Botany*, a correspondence with numerous friends, and the entertainment of visitors, for Withering was now possessed of a Continental reputation as a botanist, a physician, and a philosopher. When he could no longer practise medicine he had more time to devote to botany and his other hobbies and experiments in breeding and the cultivation of his estate at Edgbaston. So the years passed with repeated attacks of pleurisy and hæmoptysis, and periodic recovery. Then in 1799 he decided to move to a smaller house on the south side of the town; having supervised the details of the necessary reconstruction all the summer, he moved in September. But the move and the illness of his wife were too much for his feeble body, and on Sunday, October 6, 1799, he died. His funeral at Edgbaston Old Church was attended by a large congregation, with Established and Dissenting Clergy officially present, a rare event at that date. And a friend wrote that the flower of English botany was Withering.