



[From Galen: De Simplicium, Venice, 1625.]

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WILLIAM WITHERING

AND THE INTRODUCTION OF DIGITALIS INTO MEDICAL PRACTICE*

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PART I



HE Botanical Professor gives annually a gold medal to such of his pupils as are most industrious in that branch of science. An incitement of this kind is often productive of the greatest emulation in young minds, though, I confess, it will hardly have charm enough to banish the disagreeable ideas I have formed of the study of botany."

This was written by William Withering in a letter to his parents in 1764, when he was a medical student at Edinburgh. He was then twenty-three years of age and it is not a little remarkable that such a statement should have been made by one destined to be one of the greatest of botanists and perhaps the

greatest of the medical botanists. As a botanist it may be said that he flowered late, for he did not begin the study of that science until he was about thirty years old.

William Withering was born March 17, 1741, at Wellington in Shropshire, England. The name was originally Witherings and also Witherington and Widdington. Whittington belongs to this same name group, a fact of interest as Dick Whittington of cat and Lord Mayor of London fame came from the West Country. Thomas Witherings was the first postmaster-general of England, appointed by King Charles I on July 31, 1635. The name, Withering, is probably of place or of occupational origin, a withering floor being the term applied to the drying floor of a malt house.

The great-grandfather of William Withering was James Witherings of

* The year 1935 was the 150th anniversary of the publication of Withering's famous book "An Account of the Foxglove."

Cheswardine. His grandfather was also William Withering. His father, Edmund, was born December 30, 1712. His mother was Sarah Hector, born November 18, 1708, so she was somewhat more than four years older than her husband, whom she outlived twenty years, dying at the age of eighty-one. They had three children: Mary, who died in infancy, William, and Sarah the youngest, born February 12, 1750.

Withering's father, Edmund Withering, was a physician and his mother belonged to a well-known medical family. She was a sister of Dr. Brooke Hector of Lichfield. Her father, Dr. George Hector, had delivered Samuel Johnson and so could have claimed the distinction of having ushered one of the greatest of men into the world. Another of her brothers, George Hector, and a cousin, Edmund Hector, both of whom became physicians, went to school with Johnson. Withering's mother was also distantly related to Bishop Hurd of Worcester.

Withering's father was a highly successful practitioner in Wellington and the surrounding district. With such parents the home in which the future botanist grew up was a pleasant one. He testified himself to his excellent upbringing. As respects his education, it was not remarkable. He received a good grounding apparently in the classical languages from a neighboring clergyman, the Reverend Henry Wood of Ercall, and passed through the usual course of study in mathematics, geography and history, necessary for entrance into the University. He seems to have been a good student but showed little in the way of either precocity or brilliance of intellect. His father desired him to study medicine and his own inclinations were towards his fa-

ther's profession. In 1762, at the age of twenty-one, he entered the University of Edinburgh, then becoming celebrated for the excellence of its medical school. Among the members of its faculty at the time were several whose names are written high in the history of medicine in the eighteenth century. Foremost of these was probably the anatomist Alexander Monro, usually designated as Monro primus to distinguish him from his equally famous son, also Alexander Monro, referred to as secundus. Both were professors at Edinburgh when Withering entered, Alexander Monro secundus having been named assistant to his father in 1756. The second Monro was an exception to the rule that a famous father seldom has an equally eminent son, a rule also broken in the case of the elder and younger Pitt. Monro secundus is remembered by the foramen of Monro. He was succeeded as professor of anatomy by his son Alexander Monro tertius, so that the chair of anatomy was held by three generations and for a period of one hundred and twenty-six years, from 1720 to 1846, by these three men, a remarkable example indeed of a "medical dynasty." One would have to go back to the Aesclepiades of the Greek temple-sanitaria to find a similar passing of professional knowledge and privilege from father to son. During the period from 1720 to 1790, Garrison states, nearly 13,000 students were taught by the first two Monros and their fame did much to attract students and to make the medical school celebrated throughout Europe. The *Lancet* recently carried the obituary notice of Dr. G. H. Monro-Home, the great-grandson of Alexander Monro tertius, who died in March 1935, thus bringing this famous medical name to our own time.

Joseph Black, called the Nestor of eighteenth century chemistry, who established the doctrine of latent and specific heat and was the discoverer of carbonic acid gas, was professor of chemistry at Edinburgh. He had numbered among his pupils Oliver Goldsmith, who had also been a medical student there. The most notable figure among Withering's professors, aside from Monro primus, was William Cullen, born in Lanarkshire in 1712. He had risen to eminence from the deepest poverty. He began as a barber, became a surgeon apothecary, a ship's surgeon, and finally associated himself with William Hunter in the small town of Hamilton. Both were equally poor and equally ambitious. In order to gain a university education, on which they both had set their hearts, they agreed that one should practice and earn the money for the other to complete his studies. Alternating in this manner they both graduated, Cullen in 1740. It is not remarkable that two such men should have left honored names to posterity. Cullen was Withering's teacher of the practice of medicine. He was said to have been the first instructor at an English or Scottish university to abandon Latin in the classroom and to give his lectures in the English language. He was also a great believer in clinical teaching and his "Clinical Lectures" and his "Materia Medica" were standard textbooks. He wrote a "Practice of Physic" that was one of the most popular compends of internal medicine ever printed. It was used far into the nineteenth century and was one of the books almost invariably found on the shelves in the office of the country doctor in our western settlements. Cullen has endeared himself to lovers of poetry by the assistance he gave to the widow of Burns.

Robert Whytt, one of the most important English students of neurology and the author of an excellent account

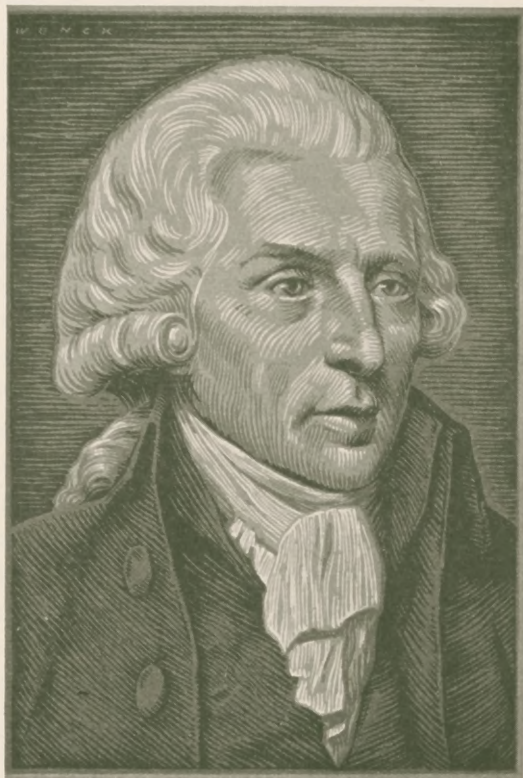


FIG. 1. WILLIAM WITHERING

of hysteria, was another of Withering's teachers. Dr. John Hope was professor of botany and founder of the Botanical Gardens of Edinburgh. One of Withering's friends and associates in Edinburgh was Richard Pulteney, afterward a Fellow of the Royal Society and author of "The Historical and Biographical Sketches of the History of Botany in England." It is possible that his pleasant association with Pulteney may have favorably inclined Withering to the "gentle science" in spite of his earlier avowal of lack of interest in it.

Robertson, the celebrated historian, was chancellor of the university at that time, and David Hume, the historian, was another whose name added to the luster of the school.

The tutor assigned to Withering was a Dr. Hay, described as an "experienced physician." The tutor was more than a professional teacher. He was a real mentor and guide and it was his custom to invite the assigned students into his home on Saturday afternoons. Withering thus soon made acquaintances among the hospitable Scottish people, who in turn frequently had the young Southron as a guest. It is not surprising that he soon felt at home in the agreeable society of the picturesque old capital of Scotland, and enjoyed the fine old city and its beautiful environs, and his newly made friends, including, says his son in his memoirs of his father, many "that there may with peculiar propriety be termed the fair sex." It is certain that the favorable impression of Scotland and her people remained with Withering throughout his life, for he continued correspondence with many Scottish friends, teachers and classmates, and was always a lover of Scotland. Among other things, he learned the national game and became a golfer. He even learned to play the national instrument, the bagpipe.

It was while a student at Edinburgh that Withering became a member of the Masonic Order. He appears to have entered the fraternity in 1762, though recent inquiries to the Grand Lodge of Scotland fail to reveal any record of his name.

He became a member of the student medical society, frequented the newly founded library of the university, and apparently was a diligent student transcribing lectures, making abstracts of each course, and keeping a number of note books.

He returned home on his first vacation, by boat, taking a small coasting craft from Leith to London. Thomas Arnold, a fellow student and afterwards

a well-known physician and author of a book on mental diseases, accompanied him. His return to Edinburgh University in the autumn of 1763 was made on horseback, Arnold again being his companion. They stopped for some days at York and made several sightseeing tours about this ancient and famous city, the birthplace of Robinson Crusoe, and possessing one of the most beautiful cathedrals in Europe. They had as a guide a local apothecary and surgeon named Thomas Fowler, well known to all physicians and pharmacists as the originator of Fowler's solution, the *Liquor potassii arsenitis*. Fowler was still a young and unknown country apothecary. Withering returned on his second vacation by way of the Peak District of Derbyshire, noted for its scenery. He also spent part of this vacation in London visiting the hospitals and attending medical lectures. It is certain that he attended the lectures of William Hunter who was then located in Great Windmill Street.

In his last two years at Edinburgh he was a member of a Latin club among the students, the object of which was to improve the knowledge of the Latin tongue, then a universal language, a sort of Esperanto for the learned of all nations. He also read a number of papers before the student medical society, one on the first aphorism of Hippocrates forbidding sudden change in diet or exercise, others on rickets, "angina inflammatoria," and dropsy, the latter a subject to which he was to make so great a contribution later in his career. Among some of his fellow students in the society were Arnold the psychiatrist, Rogerson, later physician to Empress Catherine of Russia, and Walter, a Virginian who became a physician of note in the Old Dominion and a member of the Virginia House of Burgess.

Withering graduated at Edinburgh with the degree of "Doctor of Physic," granted July 31, 1766. His thesis, or inaugural dissertation as it was called, was on "Malignant Putrid Sore Throat." This essay with some additions, mainly from clinical observations in several severe scarlet fever epidemics, formed the basis of his monograph on the sore throat of scarlet fever, or what we would now call streptococcic sore throat. His graduation thesis was in Latin and was dedicated to his uncle who had also been one of his preceptors in the art of medicine, Dr. Brooke Hector, and also to his childhood instructor in classical learning, the Reverend Henry Wood.

Withering seems to have possessed the practical knowledge of the Latin tongue then necessary for a member of a learned profession to have without being a Latinist of any distinction. It must be remembered that many physicians have been distinguished classical scholars. Heberden was one of the greatest Greek and Hebrew scholars of his time, and Linacre vied with Erasmus as one of the founders of the classical learning of the Renaissance. Withering, however, may be said to have had only an essential knowledge of the classics without any refinements. His attitude towards learning other languages than his own is interesting, shows independence of thought, is practical, and in line with more modern views. He says that he could not but "deem it a heavy task, during the short space of our existence, to be compelled to learn so many signs to indicate the same thing." Societies for the advancement of universal languages might well adopt this sentiment as their motto.

It was still fashionable for young men in easy circumstances to make a tour of the Continent as a supplement

to their more formal education. Withering made such a tour in the summer and fall of 1766. He accompanied a young man, a Mr. Townsend, described as a "gentleman of independent fortune familiar with the manners and language of the French." The tour, however, was not a happy one. Townsend, who seems to have been in frail health, possibly a sufferer from tuberculosis, died, and Withering, whose knowledge of French was rather scanty, had much difficulty with the petty officials. The effects of a foreigner and a non-Catholic were subject to seizure by the Government and he had much trouble securing the release of his friend's clothing and baggage and returning it to his relatives in England. The whole of his journey in France was marred by the incident and he returned to his home as soon as possible. He had taken care of his young companion in his last illness, and had behaved extremely well in the trying circumstances following, and Mr. Townsend's family and friends expressed their gratitude to Withering on his return.

Withering spent Christmas at home after his tour in France and while assisting his father began to look about for a place to begin practice. He appeared to have considered Chester and Coventry but at last settled in Stafford. An old and well-known physician there, Dr. Buchanan, had recently died, thus creating a vacancy. At the same time Withering had treated with success a prominent person near Stafford, always a fortunate beginning for a young doctor just starting out in his practice. Stafford also, though a small place, was near home where the good reports of his father and medical uncles would also be of aid to him.

In 1766 the Stafford Infirmary had been built for the benefit of the town

poor and Withering was appointed the first physician in charge of it. Stafford was a small town in southern Staffordshire, not far from where Shropshire, Staffordshire and Warwickshire meet. Shropshire, the county of Withering's birth, was on the border of Wales and like the counties of the Scottish border had a romantic story of border wars, and the towers and castles of the Marches of Wales are full enough of history and legend to make the fame of a Welsh Sir Walter Scott. Near Withering's birthplace of Wellington was a tall hill called the Wrekin, a prominent feature of the landscape. It gave rise to a famous local toast "to all around the Wrekin." The county is also known as Salop, and the natives of Shropshire often speak of themselves as Salopians. It is the home of a famous breed of sheep familiar to American farmers. The area was largely a rural country checkered with woodland and field. Oaks grew so well there that they were called the "Shropshire weed." The foxglove, later to make Withering famous, also grew like a weed throughout the midland and western counties of England. Here is what Burroughs, the American naturalist, says of the foxgloves observed by him:

In traveling south from Scotland, the foxglove traveled as fast as I did, and I found it just as abundant in the southern counties as in the northern. This is the most beautiful and conspicuous of all the wild flowers I saw, a spire of large purple bells rising above the ferns and copses and along the hedges everywhere. Among the copses of Surrey and Hants, I saw it five feet high, and amid the rocks of Wales still higher. We have no conspicuous wild flower that compares with it. It is so showy and abundant that the traveler on the express train cannot miss it; while the pedestrian finds it lining his way like rows of torches. The bloom creeps up the stalk

gradually as the season advances, taking from a month to six weeks to go from the bottom to the top, making at all times a most pleasing gradation of color, and showing the plant each day with new flowers and a new fresh look. It never looks shabby and spent, from first to last. The lower buds open the first week in June and slowly the purple wave creeps upward; bell after bell swings to the bee and the moth, till the end of July when you see the stalks waving in the wind with two or three flowers at the top as perfect and vivid as those that opened first. I wonder the poets have not mentioned it oftener.

Such a countryside was well suited to develop a botanist.

Despite the advantages of good education, pleasing appearance, winning personality, the fact that his father and uncles were well-known medical men in that part of England, and his official connection as physician to the newly established Infirmary for the poor at Stafford, Withering's practice was not, for a few years at least, so extensive that he did not have leisure for other matters. This was to his advantage, for he had a much too lively and vigorous intellect to remain idle and soon engaged in many activities which not only contributed to his health and well-being but had an important relationship to his future success and reputation. As Withering's fame rests principally upon his attainments as a medical botanist a peculiar interest attaches to the circumstances surrounding the beginning of his botanical studies. His indifference to botany expressed while a student at Edinburgh may have been partly overcome through his friendship with Richard Pulteney, the historian of British botany and the first English biographer of Linnaeus. It is certain, however, that a more romantic reason was the cause

of turning his attention more directly to the subject. Among his earliest patients at Stafford was a young lady, Helena Cooke, the daughter of Mr. and Mrs. George Cooke, who afterwards became his wife. She was interested in flower painting and when caring for her as a patient and during her convalescence from an illness Withering gathered plants for her to use as subjects for her drawings. As she was one of his first patients at Stafford, the spring and summer of 1768 may be given as the beginning of Withering's botanical studies. It was but eight years later in 1776 that he published his important book on British plants, and but seventeen years later, namely in 1785, that his famous account of the foxglove appeared, one of the classics of medical literature.

Withering had always been interested in geology, mineralogy and antiquarian matters. He no doubt combined his professional calls with field excursions in botany and mineralogy, stopping his horse by the roadside to secure a desirable specimen and returning from his professional calls with a handful of plants for his herbarium or with cones, fruits, nuts, roots, rocks or minerals.

He seems to have found time for still lighter things. He frequented the bowling green at Wolseley Bridge, was a member of an amateur dramatic club which presented Shakespeare in Shakespeare's own countryside, and took part in musical gatherings, being a performer on the flute and bagpipe. He had learned to play the latter in Scotland and he no doubt astonished his West Country friends with his performance on this instrument, then relatively unknown in that part of England.

Like many naturalists Withering was a lover of poetry and was particularly fond of those poets whose works con-

tained allusions to natural objects and descriptions of scenery. It is known that at this time he read extensively in Tasso and Horace, as well as the poems of Miss Carter, Young's "Night Thoughts," and Thompson's "Seasons." He made a complete ms index of the latter for his own pocket copy. It was perhaps the study of this poem also that interested him in climatology. In any event, he began about this time to keep a meteorological journal.

Withering's marriage took place on the 12th day of September, 1772. His marriage led him to look about for an opportunity to extend his practice and increase his income, which then did not exceed one hundred pounds a year. The town and area of surrounding country from which he drew his patients was too small to provide a much larger income but it was not until 1775, three years after his marriage, that an opportunity came for him to leave Stafford for a larger place. In the early winter of that year he received a letter from Erasmus Darwin, the grandfather of Charles Darwin, regarding an opening for him at Birmingham and urging him to take advantage of it. In view of subsequent evidence of ill-feeling toward Withering, the letter is of considerable interest and is here quoted. Darwin was evidently anxious to advance his young colleague's prospects and it was only after he had attained to distinction and tended to eclipse him, both as a scientist and as a physician, that Darwin displayed jealousy or ill-feeling toward him.

Lichfield,

February 25th, '75.

Dear Doctor,

I am at this moment returned from a melancholy scene, the death of a friend who was most dear to me, Dr. Small, of Birmingham, whose strength of reason-

ing, quickness of invention, learning 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 abilities.

A person at Birmingham desired I would acquaint you with Dr. Small's death as soon as I could, but would not permit his name to be mentioned, lest he might disoblige some whom he did not wish to disoblige. It was said that Dr. Smith, who has been there a few months, had no chance at all of succeeding in that place from his defect in hearing. 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 Dr. Small's papers that he had gained about 500 pounds a year at an average taking the whole time he had been at Birmingham, and above 600 pounds on the last years. Now as this was chiefly in the town, without the expense and fatigue of travelling and horsekeeping, and without being troubled with visiting the people, for he lived quite a recluse studious life, it appears to me a very eligible situation. Add to this that he had increased his fortune by some other circumstance of manufacture or schemes which such a town affords. If you should think this prospect worth your going to see Mr. Boulton at Soho to inquire further into, I will take care to leave at home a proper letter for you to him if I should not see you.

I was very fortunate in recommending Dr. Bates to Aylesbury, and Dr. Wright to Newark, but think in my own mind this of the internal business of Birmingham to be, all put together, the most eligible of any country situation, but I think no one who has not some philosophical acquirements as well as medical is likely to succeed in it.

I shall not mention having wrote this letter to you but shall be glad of a line in

answer, and please to put private on the internal cover.

Adieu.

E. Darwin.

To Dr. Withering.

Private.

Withering's professional reputation and his success as physician to the Infirmary at Stafford had been partly responsible for the desire of Darwin to have him settle in Birmingham. More directly interested was Dr. John Ash, the founder of the General Hospital at Birmingham, who was anxious to obtain his services as a junior at that institution.

Birmingham, or "Brummagen" as it was frequently pronounced, is now one of the great industrial centers of the world, and has been famous as a seat of mechanical industries and for the skill of its artisans since the Middle Ages. The region abounds in coal and iron, the Black County of Staffordshire being honeycombed with mines. The first guns manufactured in England had the Birmingham mark. Its swords were celebrated. Camden described the place in the sixteenth century as "full of inhabitants and resounding with hammers and anvils." Its industries eventually developed along the lines of ornamental metal work in brass, steel and also the precious metals. As Sheffield became the center for cutlery, and Manchester for cotton weaving, Birmingham became the center for the making of buckles, buttons and all sorts of fancy articles of metal. Mechanical toys were a specialty and toward the close of the eighteenth century Burke called it the "great toy shop of Europe." The trifling character of many of these articles has given us the word "Brummagen" as an adjective for anything of little value. The town was full of enterprise and men of enterprise. One of the leading

manufacturers was Matthew Boulton who deserves to be known as one of the greatest men of the eighteenth century. Inheriting a moderate fortune from his father, Boulton established a factory at Soho, now a suburb of Birmingham but then in the country. He became interested in the steam engine, just being developed by James Watt, who was invited to come to Birmingham as his partner. The development of the steam engine was carried out in partnership with Boulton who was the commercial member of the association, supplying the business knowledge and experience as well as the capital. Boulton was one of the greatest as well as one of the best of the types so commonly referred to now as "captains of industry." Another of those who were associated with Boulton was William Murdock, the inventor of gas lighting. All his contemporaries unite in praising Boulton's ability, his character, and his tall and noble person and fine radiant countenance. Boswell, who visited Soho in 1776 to see the newly invented steam engine, has a famous reminiscence, one of the best of Boswell's anecdotes. "I shall never forget," he says, "Mr. Boulton's expression to me when surveying the works. 'I sell here, Sir, what all the world desires to have—Power.' He had about seven hundred people at work. I contemplated him as an iron chieftain and he seemed to be a father of his tribe." Dr. Small, whose death had led to the invitation to Withering to come to Birmingham, was a close friend of Boulton, who trusted him not only as a professional adviser but leaned upon him for advice on the value of mechanical appliances and for his business acumen.

Small was a man of much talent, had a bent for mathematics and mechanics, and was an inventor of much ingenuity himself. It is of interest to remember

that Small had once been professor of natural philosophy at William and Mary College in Williamsburg, Virginia, and had returned to England and settled at Birmingham.

Withering was succeeded at Stafford by a physician and pharmacist whose name is well known to both professions. This was Thomas Fowler of York who, it will be remembered, had been Withering's host and guide about that city when he had stopped there on his journeys to and from Edinburgh. It was in 1786, while still at Stafford, that Fowler published his "Medical Reports of the Effects of Arsenic in the Cure of Agues, Remitting Fevers, and Periodic Headaches." This work is a pharmaceutical classic and contains Fowler's description of the preparation since known as Fowler's solution and found in our pharmacopeia as the *Liquor potassii arsenitis*. His remedy was developed from a quack remedy called "Tasteless Ague and Fever Drops," which Fowler tried with success and improved. Fowler deserves recognition as the pioneer in the use of arsenic in therapy.

Withering actually removed to Birmingham in May, 1775. The period at Stafford had been an important one for him. There he acquired the practical professional experience, confidence and maturity of judgment necessary for a great clinician. He had developed into a botanist and mineralogist. There he had married and a son who died in infancy and a daughter, Charlotte, were born. Another son, William Withering, Jr., who survived his father and was his biographer, was born in the latter part of 1775 in Birmingham. Withering had left his young wife and family behind him at Tettenhall when he first went to Birmingham, and for a time he took lodgings at Number 10, The Square. As soon as he was fairly well established

and arrangements for his family made, he moved into a house at Number 9, Temple Row, where his next door neighbor was Dr. John Ash, his chief at the General Hospital.

The results, as respects his professional income, of his move from a country town to a bustling city such as Birmingham, were as much as Withering had anticipated. During his first year it was more than doubled and soon reached one thousand pounds a year, or more than his entire professional income during the eight years at Stafford.

The comparative leisure which those years at Stafford had afforded for scientific pursuits now began to bear fruit, and in the summer of 1776 Withering published his first book and the one on which his reputation as a general descriptive botanist rests. This was entitled "A Botanical Arrangement of all the Vegetables Naturally Growing in Great Britain with Descriptions of the Genera and Species according to Linnaeus." This was the first complete flora of the British Isles in English, the works of Thomas Johnson and Ray and others being in Latin, and the herbal of John Gerard being extremely incomplete. In two volumes and bound in what the booksellers called "old sprinkled calf," it was illustrated with twelve fine copper plates. Copies of this work are now scarce and fifteen dollars is a low price for one of these first editions. Included was a description and an interesting picture of a microscope devised by Withering for botanical study primarily. Withering also contributed a description of this microscope and figure to the first edition of the *Encyclopedia Britannica*. Withering's botany had many readers and passed through three editions in the author's lifetime. A fourth edition revised by his son and containing four volumes was published

in 1818. For fifty years it was extensively read. There were several reasons for its popularity. In the first place, natural history and botany had become popular and fashionable pursuits during the eighteenth century. The works of Linnaeus and Buffon, and the descriptions of the flora of India, China, South Africa, Australia and the New World, sent in by amateur and professional botanists, a large number of whom, by the way, were physicians, and the work of such naturalists as Gilbert White, had given natural history more of a vogue than radio-set making or golf has now. An examination of Withering's work shows many reasons why it should have become a best seller. He devoted much space to matters of interest such as natural places of growth of the plants described, their time of flowering, their economic uses as foods and drugs, and their poisonous properties. Methods of botanical investigation and how to dry and preserve specimens were included in his "Elements of Botany." He also gives the different English names used by the former herbalists Gerard, Parkinson, Blackwell, Culpeper and others. His book was in effect a translation of the herbalists in scientific form but written in English and not in Latin, and it was the first time that a really scientific classification and description of British plants had been published in the vernacular. Mr. G. Claridge Druce, a Secretary of the British Botanical Society in 1920, said in a letter quoted in Cushing's biography of Osler, that "Withering's 'Arrangement of British Plants' in 1776, was the chief British botanical text book for many years."

Despite the demands of his increasing medical practice and the work required for the publication of this botanical treatise, Withering found time

to devote to mineralogy and chemistry. He alternated these with his botanical pursuits, depending on the season. As he expressed it at the beginning of winter, "Botany now no longer presides at my board—her season is past, and chymistry overspreads the table."

He translated about this time the memoir of the great Swedish chemist Bergmann, on the analysis of water, and at the same time made analyses of the waters of many famous English springs and wells, and artificially prepared the waters of some of the Continental watering places and spas. Withering's study of the natural and medicinal properties of mineral waters of Great Britain was practically the first really scientific examination and analysis made. Withering, too, in 1776, contributed some scientific notes to a book written by an Irish traveler, John Talbot Dillon, better known as Baron Dillon, who published in that year "Travels through Spain, with a view to illustrate the Natural History and Physical Geography of that Kingdom." Withering also investigated the solubility of salts, Peruvian bark, and urinary calculi. His mineralogical researches were important and his discovery of native barium carbonate, named in 1790 by Werner "witherite," has given him a definite place among mineralogists. This mineral, which occurs in large masses and in crystalline form near Hexham, Northumberland, is a white to grayish or yellowish material extensively used in sugar refining, plate glass making, and paint manufacture. Withering undoubtedly made another contribution to our knowledge of the barium compounds of which chemical historians apparently are unaware. Mr. George Fowles of London has drawn my attention to the fact that Withering was the first to point out the value of

baryta as a test for the sulphates and thus deserves credit for priority in respect to this important test so well known now to every high school boy who has taken chemistry.

In 1782 Withering published two papers, one "The Analysis of Two Mineral Substances, the Rowley Ragstone and the Toadstone," and the other, "Experiments on Different Kinds of Marl found in Staffordshire."

Withering's scientific attainments were by this time well known not only to scientific and professional friends but to many of the people in and about both Stafford and Birmingham, and it was no uncommon thing for plants, animals, minerals or any sort of natural object believed to be of interest or unknown to the finder, to be brought to him. There is an amusing story, related by his son, of a country laborer who found and brought to him a stone so perfectly formed in the likeness of a human heart as to be a really remarkable natural object. The amusing feature, however, was that the finder in all simplicity and honesty brought it to Dr. Withering as probably the heart of that Pharaoh hardened by the Lord as related in Genesis.

Withering soon became one of the members of the famous Lunar Society at Birmingham. The friends of Boulton had formed a society which met in turns at the houses of the members, usually once a month. In those old days of bad highways and horse and carriage, the time of the full moon was chosen as the time of meeting to better light the members on their ways to and from their respective homes. This provincial society included as many famous names as the better known club in London presided over by the august Samuel Johnson. In addition to Boulton, the members included James Watt, the in-

ventor of the steam engine and in Withering's opinion a man as great as Newton; Josiah Wedgwood, the famous manufacturer of pottery; Dr. Erasmus Darwin, the grandfather of Charles Darwin; Dr. Small; Dr. Withering; Joseph Priestley, the discoverer of oxygen, and Baskerville the printer. Many distinguished men attended the meetings of the society as guests, among them being Banks and Solander the botanists, Herschel the astronomer, Smeaton the engineer, and Benjamin Franklin.

Mrs. Schimmel-Penninck, a lady whose memoirs were once popular, has left a very interesting account of this society, most of whose members she knew. The following is an extract from the "Life of Mary Ann Schimmel-Penninck," 1858:

My father belonged to a little society of gifted men, who, spending a day alternately once a month at the house of each of its members, were called the Lunar Society. Amongst them were Mr. Boulton, the father of Birmingham, and the institutor of the Mint there; and his partner, Mr. Watt, whose immense general knowledge was the delight of all who knew him, and whose discovery in the application of steam has revolutionised the process of manufactures and of land and ocean travelling through the whole civilised world. Captain Keir, also, was one of this intellectual galaxy; he was the wit, the man of the world, the finished gentleman, who gave life and animation to the party. He often brought with him his intimate friends, Mr. Edgeworth and Mr. Day. To this society also belonged the celebrated Dr. Withering, distinguished alike in botany and medicine; and of whom it was said, years afterwards, when his life was terminated by a lingering consumption, "The Flower of Physic is indeed Withering." Quite different from that of those I have described was the aspect of Dr. Withering. He was the personification of that

which belongs to a physician and a naturalist; enormous were his organs of proportion and individuality, and great were his powers of active investigation and accurate detail. His features were sharpened by minute and sagacious observation. He was kind, but his great accuracy and caution rendered his manner less open, and it had neither the wide popularity of Mr. Boulton's, nor the attraction of Mr. Watt's true modesty. When Dr. Withering was writing his work on *Fungi*, it was often the occupation and interest of our walks as children to search for the curious species in which the woods of Barr abounded; but as it was expected we should bring some new specimens daily (which was no easy task), and as my father happened to be showing us experiments with various acids and alkalies in solution of metals, we often amused ourselves by painting over the fungi in sundry methods in order to increase our variety and puzzle the doctor, and it was not till long after that we told him of our misdeeds. [Pp. 42-43.]

Withering had at one time been much interested in the phlogiston theory to which he was strongly opposed, and he read before the Lunar Society some humorous verses he had composed entitled the "Life and Death of Phlogiston." He had carried on extensive research on phlogiston but relinquished his inquiry in favor of his Lunar Society friend, Joseph Priestley, who with Lavoisier was concerned with the final overthrow of the theory of phlogiston and ended one of the most famous controversies in the history of science.

In the course of a few years Withering, despite the time he devoted to botany and mineralogy and other scientific pursuits, and the fact that in 1776 he saw the beginning of the ill-health that from then on was to dog his footsteps, had the largest practice in Birmingham and according to some "the largest practice outside of London." At the Gen-

eral Hospital he held a daily clinic for the poor and it is said he treated from two to three thousand cases annually without charge. When he first came to Birmingham he continued for a time as physician to the Stafford Infirmary until his successor there, Dr. Fowler, was established. This required a weekly trip of sixty miles. He was sought as a consultant from all over the Midland and Western counties and Wales, and indeed even farther. Many wrote for medical advice. Among the most celebrated of this last class of his patients was Benjamin Franklin, who wrote from Paris in regard to the treatment for urinary calculus. In 1785 Withering traveled 6,303 miles on professional visits. In those days of bad country roads and horse-drawn vehicles this was a tremendous task. He had a light in his carriage and sometimes made notes while driving, or examined specimens of plants or minerals collected on his journeys. He had his carriage overturned on one occasion and sustained a fractured collarbone. There is no mention of a highwayman anywhere and one is inclined to think they were not as numerous as some of the eighteenth century prints would have us believe. His professional income was soon well over £1,000 a year. It is stated that it did not exceed £2,000. If that was the case, it was considerably below that of some of the great London physicians. Fothergill made £5,000, and Lettsom, it is said, made £12,000 in a single year. The usual charge by a physician of repute in London at that time was a guinea. Mead charged a guinea for an office call and two guineas for a house call. The largest fee ever paid to a medical man was in the eighteenth century when Dimsdale received £10,000 for inoculating Catherine of Russia and her family against smallpox, £2,000 for

traveling expenses, a pension for life of £500 a year, and was created a baron of the Russian Empire. In addition, he was given valuable presents both by Catherine and many of the nobility who, following the royal example, had themselves and families inoculated by the English physician. When the relative purchasing power of money at that time and now is considered the real size of this fee is more readily appreciated.

In 1778 there was a very severe epidemic of scarlet fever in Birmingham and indeed in the whole of England and Wales. In the following year Withering published the results of his experiences in this epidemic in book form, under the title, "An Account of the Scarlet Fever and Sore Throat or Scarlatina Anginosa, particularly as it appeared in Birmingham in 1778." A second edition of this book appeared in 1793. Withering's description of scarlet fever and of the dropsy that so frequently followed it is excellent. In reference to the contagiousness, he says:

Whether this disease be caused by animalcules capable of generating their kind, or by certain miasmata, which have the property of assimilating other particles of matter to their own nature by some mode of fermentation hitherto but little understood, there can be no doubt but it is contagious, and perhaps so in a degree nearly equal to the smallpox and the measles.

It is evident from this that medical thought at that time was not unfamiliar with what amounted to a germ theory of disease, the "animalcules capable of generating their kind" being a fair substitute for bacteria. He showed great common sense in dealing with the question of isolation and quarantine:

For several years I have never thought it necessary either to break up a school or to disperse a private family. Allotting

apartments on separate floors to the sick and to the healthy; choosing for nurses the older parts of the family or such as had had the disease heretofore, and prohibiting any near communication between the sick or their attendants and the healthy . . . has very universally been found sufficient to check the further progress of the infection.

His treatment was simple and rational. He opposed bleeding and purgation and recommended emetics to free the throat from membrane. He found the incubation period but three to four days. His description fits streptococcic sore throat exactly though no doubt some of his cases were complicated by diphtheria and Vincent's angina.

Withering's first use of foxglove in his practice was in 1775, the year before he left Stafford for Birmingham. How it was first called to his attention is of such interest that it is given here in his own words:

In the year 1775 my opinion was asked concerning a family recipe for the cure of dropsy. I was told that it had long been kept a secret by an old woman in Shropshire who had sometimes made cures after the more regular practitioners had failed. I was informed also that the effects produced were violent vomiting and purging; for the diuretic effects seemed to have been overlooked. This medicine was composed of twenty or more different herbs; but it was not very difficult for one conversant in these subjects to perceive that the active herb could be no other than foxglove.

The knowledge of the use of foxglove in dropsy may have been known in household medicine in that part of England just as a knowledge that cowpox protected against smallpox was known in Gloucestershire long before the time of Jenner. It needed a man like Withering to study in a scientific manner the effects of this rural remedy

and introduce it to the pharmacopeia just as Jenner had taken the countryside tradition of cowpox and by study and observation developed the practice of smallpox vaccination from it.

George Eliot, who was born in Warwickshire and who was probably not unacquainted with Withering's name and work, has in her novel "Silas Marner" described the use of the foxglove by Silas to cure a peasant woman of the dropsy, and indicates beautifully the use of digitalis as a secret remedy used in that district. The passage in which the novelist tells of the incident is of such interest to a medical reader that it is quoted here in full. She mentions how . . .

Marner had cured Sally Oates and made her sleep like a baby, when her heart had been beating enough to burst her body for two months or more, while she had been under the doctor's care. He had inherited from his mother some acquaintance with medicinal herbs and their preparation but of late years he had had doubts about the lawfulness of applying his knowledge, believing that herbs could have no efficiency without prayer, and that prayer might suffice without herbs; so that his inherited delight to wander through the fields in search of foxglove and dandelion and coltsfoot began to wear to him the character of a temptation. One day, taking a pair of shoes to be mended, he saw the cobbler's wife seated by the fire suffering from the terrible symptoms of heart disease and dropsy which he had witnessed as the precursors of his mother's death. He felt a rush of pity at the mingled sight and remembrance and, recalling the relief his mother had found from a simple preparation of the foxglove, he promised Sally Oates to bring her something that would ease her, since the doctor did her no good.

"Silas Marner" was published in

1861, and the story is laid in the latter years of the previous century.

Withering began to experiment with the drug soon after it was called to his attention in 1775. Some of his notes show that it was used on animals, the turkey being the experimental animal chosen. His professional colleague at the General Hospital, Dr. John Ash, had told him that Dr. Cawley, the Principal of Brazen Nose College, Oxford, had been cured by an empirical exhibition of the root of the foxglove after some of the first physicians of the age had declared they could do no more for him. Withering soon learned that the dosage employed was generally excessive and after some experience with the drug he declared in reference to the case of Dr. Cawley, "If he had not had a constitution very retentive of life, I think he must have died from the enormous doses he took . . . he did not take at each dose less than twelve times the quantity a strong man ought to have taken."

Withering tells an incident in reference to the overdosage of digitalis which also indicates its widespread use in domestic medicine:

I have lately been told that a person in the neighborhood of Warwick possesses a famous family recipe for the dropsy, in which the Foxglove is the active medicine, and a lady from the western part of Yorkshire assures me that the people in her county often cure themselves of dropsical complaints by taking Foxglove tea. In confirmation of this I recollect about two years ago being desired to visit a travelling Yorkshire tradesman. I found him incessantly vomiting, his vision indistinct, his pulse 40 in a minute. On enquiry it came out that his wife had stewed a large handfull of green Foxglove leaves in half a pint of water and given him the liquor which he drank at a draught, in order to cure him of an asthmatic affection. This good

woman knew the medicine of her county, but not the dose of it, for her husband narrowly escaped with his life.

At first Withering used a decoction of the foxglove leaves which he soon discarded in favor of an infusion. Gradually he gave this up and came to depend almost entirely on the powdered leaves. He recommended gathering the leaves just before blossoming time, removing the midrib, and using only the powdered leaf blade. This was dried either in the sun or before a fire and then rubbed down to a "beautiful green powder" which weighed about one-fifth the original weight of the undried leaf. The dose for an adult was one grain twice a day. He gave this powdered leaf either alone, or made with a pill with soap or gum ammoniac as an excipient, with sometimes aromatics added. He did not believe in giving digitalis oftener than twice a day. Time should be allowed for each dose to act. He continued the drug until it acted upon "the kidneys, the stomach, the pulse, or the bowels; let it be stopped upon the appearance of any one of these effects."

Withering not only used digitalis extensively himself, keeping careful case reports and notes, but he spread the gospel of its use among his medical friends with the result that it soon became known and quite generally used. Withering himself gives a good idea of the way the use of the drug became general, in the following words:

In February 1779 my friend Dr. Stokes communicated to the Medical Society at Edinburgh, the results of my experience of the Foxglove; and, in a letter addressed to me in November following, he says, "Dr. Hope, in consequence of my mentioning its use to my friend Dr. Broughton, has tried the Foxglove in the Infirmary with success. I am assured by my very worthy friend Dr. Duncan that Dr.

Hamilton, who learned its use from Dr. Hope, has employed it very frequently in the Hospital at Edinburgh."

In 1783 digitalis was included in the Edinburgh Pharmacopoeia. What led to the publication of Withering's book on the foxglove, was what he believed to be the misuse of the drug by the profession. He felt that this would lead to its being discredited and thus a valuable medicinal agent would be discarded. As he expressed it: "The use of the Foxglove is getting abroad and it is better the world should derive some information, 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 efficacy should be condemned and rejected as dangerous and unmanageable." One of those who urged him to print his experiences was Dr. Fowler at Stafford, who wrote him as follows:

I understand you are going to publish on the Digitalis, which I am glad to hear, for I have long wished to see your ideas in print about it. . . . The public at this very instant stand in great need of your precept, guards, and cautions, toward the safe and successful use of such a powerful sedative diuretic. I remember an officer in the Staffordshire militia who died here of dropsy four years ago. The Digitalis relieved him a number of times in a wonderful manner, so that in all probability he might have obtained a radical cure if he would have refrained from hard drinking.

In 1783 Withering's health broke down completely and undoubted evidence of tuberculous infection of the lungs manifested itself. He was compelled to give up practice for several months and take a complete rest and, though he made a good recovery, in the following year he was again compelled to stop work. He spent much of his time

during his convalescence at Mr. Boulton's beautiful country place at Soho. Mr. Boulton and his family being absent, he had offered his residence as a suitable place for the invalid, being in a rural location and somewhat removed from the smoke and turmoil of the city. Withering spent some of the time during this period in preparing for the Royal Society the paper "Experiments and Observations on the Terra Ponderosa," in which he described the natural barium carbonate named Witherite in his honor by the German geologist Werner, in 1790. He also translated Bergman's "Mineral Kingdom," under the English title "Outlines of Mineralogy," and edited the second edition of his British botany. The most important task, however, was the preparation of his book on digitalis. This appeared in 1785 under the title "An Account of the Foxglove" and has long since come to be considered a medical classic. It is now a rare book and a good copy with the folding plate can scarcely be obtained for less than 250 dollars. Maggs Brothers, the celebrated London booksellers, offered one in 1932 for £52.10, or about \$262.50. The volume contains but 207 pages. After a modest introduction to the subject he cites 163 cases. These are not given in great detail but are nevertheless well-written brief case reports. He follows this with some cases and reports from other physicians who have communicated with him on the subject. The last section of the book is the most important as it gives the following conclusions under the headings of: Preparation of the Drug; Effects, Rules and Cautions; Constitution of the Patients; Inferences.

These are all so important for the physician in general practice and the cardiologist that they are here repro-

duced in their entirety. In this connection it is well to draw attention to the opinion of Cushny, one of the greatest pharmacologists of our generation, "It is scarcely an exaggeration to say that the use of digitalis in the early years of the nineteenth century was precisely that prevailing a hundred years later." Withering not only introduced digitalis into medical practice but it is correct to say that he also laid down the general principles of its use, which are unchanged today.

OF THE
PREPARATIONS AND DOSES,
OF THE
FOXGLOVE

Every part of the plant has more or less of the same bitter taste, varying, however, as to strength, and changing with the age of the plant and the season of the year.

ROOT.—This varies greatly with the age of the plant. When the stem has shot up for flowering, which it does the second year of its growth, the root becomes dry, nearly tasteless, and inert.

Some practitioners, who have used the root, and been so happy as to cure their patients without exciting sickness, have been pleased to communicate the circumstance to me as an improvement in the use of the plant. I have no doubt of the truth of their remarks, and I thank them. But the case of Dr. Cawley puts this matter beyond dispute. The fact is, they have fortunately happened to use the root in its approach to its inert state, and consequently have not over dosed their patients. I could, if necessary, bring other proof to shew that the root is just as capable as the leaves, of exciting nausea.

STEM.—The stem has more taste than the root has, in the season the stem shoots out, and less taste than the leaves. I do not know that it has been particularly selected for use.

LEAVES.—These vary greatly in their efficacy at different seasons of the year,

and, perhaps, at different stages of their growth; but I am not certain that this variation keeps pace with the greater or lesser intensity of their bitter taste.

Some who have been habituated to the use of the recent leaves, tell me, that they answer their purpose at every season of the year; and I believe them, notwithstanding I myself have found very great variations in this respect. The solution of this difficulty is obvious. They have used the leaves in such large proportion, that the doses have been sufficient, or more than sufficient, even in their most inefficacious state. The Leaf-stalks seem, in their sensible properties, to partake of an intermediate state between the leaves and the stem.

FLOWERS.—The petals, the chives, and the pointal have nearly the taste of the leaves, and it has been suggested to me, by a very sensible and judicious friend, that it might be well to fix on the flower for internal use. I see no objection to the proposition; but I have not tried it.

SEEDS.—These I believe are equally untried.

From this view of the different parts of the plant, it is sufficiently obvious why I still continue to prefer the leaves.

These should be gathered after the flowering stem has shot up, and about the time that the blossoms are coming forth.

The leaf-stalk and mid-rib of the leaves should be rejected, and the remaining part should be dried, either in the sun-shine, or on a tin pan or pewter dish before a fire.

If well dried, they readily rub down to a beautiful green powder, which weighs something less than one-fifth of the original weight of the leaves. Care must be taken that the leaves be not scorched in drying, and they should not be dried more than what is requisite to allow of their being readily reduced to powder.

I give to adults, from one to three grains of this powder twice a day. In the reduced state in which physicians generally find dropsical patients, four grains a day are sufficient. I sometimes give the powder alone; sometimes unite it with aromatics,

and sometimes form it into pills with a sufficient quantity of soap or gum ammoniac.

If a liquid medicine be preferred, I order a dram of these dried leaves to be infused for four hours in half a pint of boiling water, adding to the strained liquor an ounce of any spirituous water. One ounce of this infusion given twice a day, is a medium dose for an adult patient. If the patient be stronger than usual, or the symptoms very urgent, this dose may be given once in eight hours; and on the contrary in many instances half an ounce at a time will be quite sufficient. About thirty grains of the powder or eight ounces of the infusion, may generally be taken before the nausea commences.

The ingenuity of man has ever been fond of exerting itself to vary the forms and combinations of medicines. Hence we have spirituous, vinous, and acetous tinctures; extracts hard and soft, syrups with sugar or honey, etc., but the more we multiply the forms of any medicine, the longer we shall be in ascertaining its real dose. I have no lasting objection however to any of these formulæ except the extract, which, from the nature of its preparation must ever be uncertain in its effects; and a medicine whose fullest dose in substance does not exceed three grains, cannot be supposed to stand in need of condensation.

It appears from several of the cases, that when the *Digitalis* is disposed to purge, opium may be joined with it advantageously; and when the bowels are too tardy, jalap may be given at the same time, without interfering with its diuretic effects; but I have not found benefit from any other adjunct.

From this view of the doses in which the *Digitalis* really ought to be exhibited, and from the evidence of many of the cases, in which it appears to have been given in quantities six, eight, ten or even twelve times more than necessary, we must admit as an inference either that this medicine is perfectly safe when given as I advise, or

that the medicines in daily use are highly dangerous.

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.*

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 the 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 infrequently be checked by it. The sickness thus excited, is extremely different from that occasioned by any other medicine; it is peculiarly distressing to the patient; it ceases, it recurs again as violent as before; and thus it will continue to recur for three or four days, at distant and more distant intervals.

These sufferings of the patient are generally rewarded by a return of appetite, much greater than what existed before the taking of the medicine.

But these sufferings are not at all necessary; they are the effects of our inexperience, and would in similar circumstances, more or less attend the exhibition of almost every active and powerful medicine we use.

Perhaps the reader will better understand how it ought to be given, from the following detail of my own improvement, than from precepts peremptorily delivered, and their source veiled in obscurity.

At first I thought it necessary to bring on and continue the sickness, in order to ensure the diuretic effects.

* I am doubtful whether it does not sometimes excite a copious flow of saliva.—See cases at pages 115, 154, and 155.

I soon learnt that the nausea being once excited, it was unnecessary to repeat the medicine, as it was certain to recur frequently, at intervals more or less distant.

Therefore my patients were ordered to persist until the nausea came on, and then to stop. But it soon appeared that the diuretic effects would often take place first, and sometimes be checked when the sickness or a purging supervened.

The direction was therefore enlarged thus—Continue the medicine until the urine flows, or sickness or purging take place.

I found myself safe under this regulation for two or three years, but at length cases occurred in which the pulse would be retarded to an alarming degree, without any other preceding effect.

The directions therefore required an additional attention to the state of the pulse, and it was moreover of consequence not to repeat the doses too quickly, but to allow sufficient time for the effects of each to take place, as it was found very possible to pour in an injurious quantity of the medicine, before any of the signals for forbearance appeared.

Let the medicine therefore be given in the doses, and at the intervals mentioned above:—let it be continued until it either acts on the kidneys, the stomach, the pulse, or the bowels; 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.

The patients should be enjoined to drink very freely during its operation. I mean, they should drink whatever they prefer, and in as great quantity as their appetite for drink demands. This direction is the more necessary, as they are very generally prepossessed with an idea of drying up a dropsy, by abstinence from liquids, and fear to add to the disease by indulging their inclination to drink.

In cases of ascites and anasarca; when the patients are weak, and the evacuation

of the water rapid; the use of proper bandage is indispensably necessary to their safety.

If the water should not be wholly evacuated, it is best to allow an interval of several days before the medicine be repeated, that food and tonics may be administered; but truth compels me to say, that the usual tonic medicines have in these cases very often deceived my expectations.

From some cases which have occurred in the course of the present year, I am disposed to believe that the *Digitalis* may be given in small doses, viz. two or three grains a day, so as gradually to remove a dropsy, without any other than mild diuretic effects, and without any interruption to its use until the cure be completed.

If inadvertently the doses of the Foxglove should be prescribed too largely, exhibited too rapidly, or urged to too great a length; the knowledge of a remedy to counteract its effects would be a desirable thing. Such a remedy may perhaps in time be discovered. The usual cordials and volatiles are generally rejected from the stomach; aromatics and strong bitters are longer retained; brandy will sometimes remove the sickness when only slight; I have sometimes thought small doses of opium useful, but I am more confident of the advantage from blisters. Mr. Jones (Page 135), in one case, found mint tea to be retained longer than other things.

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, aid

ing 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 to 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.

By blood-letting, by neutral salts, by chrystals of tartar, squills, and occasional purging, I have succeeded, though imperfectly. Next to the use of the lancet, I think nothing lowers the tone of the system more effectually than the squill, and consequently it will always be proper, in such cases, to use the squill; for if that fail in its desired effect, it is one of the best preparatives to the adoption of the Digitalis.

A tendency to paralytic affections, or a stroke of the palsy having actually taken place, is no objection to the use of the Digitalis; neither does a stone existing in the bladder forbid its use. Theoretical ideas of sedative effects in the former, and apprehensions of its excitement of the urinary organs in the latter case, might operate so as to make us withhold relief from the patient; but experience tells me, that such apprehensions are groundless.

INFERENCES

To prevent any improper influence, which the above recitals of the efficacy of the medicine, aided by the novelty of the subject, may have upon the minds of the

younger part of my readers, in raising their expectations to too high a pitch, I beg leave to deduce a few inferences, which I apprehend the facts will fairly support.

I. That the Digitalis will not universally act as a diuretic.

II. That it does do so more generally than any other medicine.

III. That it will often produce this effect after every other probable method has been fruitlessly tried.

IV. That if this fails, there is but little chance of any other medicine succeeding.

V. That in proper doses, and under the management now pointed out, it is mild in its operation, and gives less disturbance to the system, than squill, or almost any other active medicine.

VI. That when dropsy is attended by palsy, unfound viscera, great debility, or other complication of disease, neither the Digitalis, nor any other diuretic can do more than obtain a truce to the urgency of the symptoms; unless by gaining time, it may afford opportunity for other medicines to combat and subdue the original disease.

VII. That the Digitalis may be used with advantage in every species of dropsy, except the encysted.

VIII. That it may be made subservient to the cure of diseases, unconnected with dropsy.

IX. That it has a power over the motion of the heart, to a degree yet unobserved in any other medicine, and that this power may be converted to salutary ends.

The whole of his views are happily expressed in a quaint little verse written by him and which should be remembered in medical poetry.

The Foxglove's leaves, with caution given,
Another proof of favouring Heav'n

Will happily display;
The rapid pulse it can abate;
The hectic flush can moderate
And, blest by Him whose will is fate,
May give a lengthen'd day.

[To be Concluded]