

THE APOTHECARY AS MAN OF SCIENCE

INTRODUCTION

The development and use of rational scientific methods was well established by the mid-seventeenth century. The collection of data and the systematic arrangement of ideas, the application of mathematics and sound reasoning, and, above all, the experimental testing of hypotheses, advocated by men of the calibre of Johan Kepler (1571–1630), Galileo Galilei (1564–1642), Francis Bacon (1561–1626), and René Descartes (1596–1650) were, by the time of the Commonwealth, accepted roads to the advancement of knowledge. A new intellectual outlook had evolved, as noted by John Aubrey (1626–97) in 1671, “Till about the year 1649 ’twas held a strange presumption for a man to attempt an innovation of learning”.

The English apothecary was, of course, much influenced by these changes. He developed methods of inquiry and investigation, he experimented, he joined societies, he wrote to like-minded contemporaries, he published his findings, and, above all, he had the good fortune to be caught in the toils of collectors’ mania, be it “curiosities” or new information. The apothecary had a particular interest in those fields that most closely impinged upon his own profession – botany, chemistry, and medicine.

Although considerable advances in the description and classification of plants and animals had been made by 1760, no great theoretical principles or “laws” of biology had been developed. It should be noted, though, that the generation of scientists arriving on the scene after 1760 was able to study an immensely richer collection of natural history specimens from distant lands, which helped towards developing new interpretations of Nature based on sounder doctrines.

The mid-century still regarded chemistry as an auxiliary of medicine and not a discipline in its own right, though some significant steps were soon to be taken. The chemistry of gases, fundamental to developing chemical thought, owed much to the quantitative methods of Joseph Black MD (1728–99) and the skilful experimental Swedish apothecary, Carl Wilhelm Scheele (1742–86). In this respect, the English apothecary made no direct and obvious contribution, but he was a part of a developing scientific community, his experiments were noticed and his papers were listened to. At his lowest assessment, he provided an audience to be convinced, a critic to be demolished, and the support and mental stimulus necessary to most intellectuals.

Medicine was, in 1760, even more fragmented than botany. Many – perhaps too many – systems and theories were enunciated, some of which were fanciful and far from useful, though Albrecht von Haller’s (1708–77) *Physiology* indicated the path to be followed. Clinical medicine was, however, making strides in the right direction, and here the English apothecary, with his bedside observation and daily supervision of the patient, came into his own. Whether he stayed an apothecary all his life, or elevated himself to physician’s rank early or late in his career, the powers of observation, medical, botanical, chemical, or pharmaceutical, that he had learned stood him in good stead.

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BOTANY

In no field of the developing sciences did the English apothecary have a better record than in that of botany, individually or corporately. It has been suggested that it was at the behest of the Society of Apothecaries that Thomas Johnson (c. 1604–44) enlarged and amended John Gerard's *Herball*, but, apart from its organized herborizing days, the apothecaries' first known corporate venture was the establishment of a physic garden at Chelsea in 1676.²⁰²

In 1680, that controversial figure, John Watts, was appointed superintendent at his own suggestion;²⁰³ not, however, without opposition. Even though his appointment had been confirmed by the court (27 February 1680), a Mr Johnson was still grumbling that he, "... desired to know what is wanting in the garden that this great charge must be brought upon the company when 1,200 plants are there in a good condition and a flourishing garden."²⁰⁴ Others had voiced their doubts by saying, "Mr Watts might be a botanick but knowed not how much a gardener." The Society's minutes until this time give the impression that the garden had been run more as a commercial herb market than a place where the study of botany would be advanced. In October 1678, it had been agreed to plant "... nectarines of all sorts, peaches apricocks, cherryes and plums of several sorts ...", and in August 1679 it was reported that, "... the Company will have a very good crop of sage, rue, pennyroyal and sweet majoram and scurvy grass the next year."

There is little doubt that John Watts' energy and enthusiasm changed this garden until it became one of the most renowned in Europe. Watts' enthusiasm was so great that he was a considerable financial embarrassment to the Company; neither was he without an eye to the main chance. Within a month of his appointment, Mr Phelps in court had moved, "... that a greenhouse is very convenient in the garden" and a sub-committee was set up. A greenhouse with a stove was erected not far from the river at a cost of £138. The garden now began to have many famous visitors. In the autumn of 1682, Dr Paul Hermann (1646–95), professor of botany at Leiden, came over, and suggested that exchange visits should be made; a suggestion taken up by Watts. Hans Sloane was a constant visitor, and wrote of the exotics he had seen, aloes and crimson amaranthus. John Evelyn was equally impressed by the "... collection of innumerable rarities particularly ... the tree bearing Jesuit's bark." He also described the greenhouse, "... the ingenious subterranean heat, conveyed by a stove under the conservatory all vaulted with brick so that he has the doors and windows open in the hardest frosts, secluding only snow." It is the first mention of the use of indirect methods of underfloor heating being used in a greenhouse, but, when so uneconomically run, no wonder the worried apothecaries wrote in December 1682, "Mr Watts was here and desires to have money paid constantly". After several years of charge and counter-charge, the Company and Watts parted around 1690.²⁰⁵

²⁰² R. H. Jeffers, *The friends of John Gerard*, Falls Village, Conn., Herb Grower Press, 1967, p. 91.

²⁰³ Guildhall Library, Apothecaries' Society court minutes, MS. 8200/2, f. 253v.

²⁰⁴ There are no further references to the displaced Mr Pratt in the Society records, but it seems likely he went as gardener to Sir Thomas Willughby, the son of John Ray's benefactor. See a letter from Ray to Sloane, 8 January 1689, in E. Lankester (editor), *The correspondence of John Ray*, London, Ray Society, 1848, p. 210.

²⁰⁵ Unlike Pratt, Watts was an apothecary and a member of the London company. For further details of

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Evidence that Watts was indeed a “botanick” and not only a gardener comes from a “curious observation” that Edmund Halley, then clerk to the Royal Society, received from him, which shows that Watts had noted the necessity of sunlight to green plants.²⁰⁶

The garden became a greater problem to the Society. For a period, James Doody managed it, something that pleased John Ray. He wrote to Aubrey, “I doubt not that he will answer the expectation men have of him and promote Botanicks.”²⁰⁷ Doody’s particular interest lay with cryptogams. After his death in 1706, a not-too-successful joint stock company was set up and the whole project might well have collapsed if it had not been for the timely help of Sir Hans Sloane. During these years, the two moving spirits were Isaac Rand (see p. 80) and, more important, James Petiver, a man of great energy.

James Petiver (1663–1718), like John Watts, Samuel Doody, and James Sherard, came from the Midlands, although his rich uncle, Richard Elborowe, held considerable property in North and South Mimms, Hertfordshire and Middlesex. After apprenticeship with Charles Feltham, apothecary to St Bartholomew’s Hospital (a not too happy choice as Feltham was fined £6 13s. 4d. for bad mithridate, ther, lond., and ther. andr.), he started on his own in Aldersgate Street near Long Lane at the sign of the White Cross. In 1695, he was elected FRS, the same year as he became apothecary to the Charterhouse.²⁰⁸

His interests were not confined to botany but ranged through the full gamut of natural history; he delighted in shells, insects, and fossils, and collected preserved reptiles, animals, and mammalian skins. He had an extensive museum of between five and six thousand plants. Unhappily, Petiver was so busy amassing his collection, he had little time to spend on conservation, and Sloane was grievously disappointed when he obtained it. No man was more assiduous in promoting the study of natural history. In an announcement of the publication of the first part of his *Musei Petiveriani*, he entreated all who travelled abroad to make collections for him. At his shop, like that of his contemporary, John Haughton, there met men interested in extending the boundaries of knowledge.²⁰⁹ The White Cross was familiar to shipmasters, merchants, planters, surgeons, consuls, and apothecaries. From there, he sent a continuous stream of letters and parcels, containing drugs and directions for treatment, news-sheets, recently printed books such as John Ray’s, paper for pressing and drying plants, wide-mouthed bottles for pickling snakes, and, perhaps most important of all, detailed instructions on how to collect the curiosities. The botanical instructions often included samples of mounted plants and, as a guide, Petiver’s *Ray’s method of English plants illustrated*. He used a number of goads to spur his collectors to greater activity; he stressed the benefit to science and mankind that would accrue and that a collector of distinction could gain promotion. He was unflinching in giving the collectors

his career, see J. Burnby and A. E. Robinson, *And they blew exceeding fine; Robert Uvedale, 1642–1722*, Enfield, Edmonton Hundred Historical Society, 1976, pp. 16–17.

²⁰⁶ C. A. Ronan, *Edmond Halley, genius in eclipse*, London, Macdonald, 1970, p. 95.

²⁰⁷ R. W. T. Gunther (editor), *Further correspondence of John Ray*, London, Ray Society, 1928, pp. 175–176, 24 August 1692.

²⁰⁸ *DNB*, vol. 45, pp. 85–86.

²⁰⁹ John Haughton or Houghton (1645–1705), the first apothecary to combine his profession with journalism; he was keenly interested in promoting agriculture.

their fair share of publicity and the articles in the *Philosophical Transactions* are full of their names. Some of his collectors seem to have had also free medical advice and medicine.²¹⁰

Ray gratefully acknowledged Petiver's assistance when he contributed many of the descriptions of the new plants that were arriving from China, Africa, and India. Ray considered him to be "the best skilled in oriental and indeed in all exotic plants of any man I know . . .; and a man of the greatest correspondence of any in England as to these matters."²¹¹ The Apothecaries' Society were wise to appoint him demonstrator at Chelsea after the death of Doody.

Petiver was a prolific writer. His first catalogue was issued in ten parts and his *Gazophylacium* in five; it contained a hundred plates and included descriptions of plants from the Alps, the Cape, and America. He wrote a number of herbals, including *Hortus Peruvianus medicinalis: or the South Sea herbal*. Typically, he endeavoured to publish a popular journal, *Monthly Miscellany* . . . , but it failed, and the third volume was never completed. As with all such busy communicators, his works were of uneven merit, but their main purpose, which was to stimulate and further the study of natural history, was achieved. His most original work was to produce "exsiccatae" or sets of dried plants with printed labels. Labels were also produced separately, printed on one side of the paper only, and were intended to be used for labelling specimens in home-produced herbaria. He introduced three sets, *Hortus siccus chirurgicus*, *Hortus siccus pharmaceuticus*, and *Botanicum Anglicum*.²¹²

It has been said that he was slipshod, but he could certainly work to a high standard of care, as witness his report on rare flowers in gardens around London in the summer of 1714.²¹³ The *Valentia* knotgrass was given its English and Latin names and all the synonyms to be found in the botanical works of Ray, Clusius, Parkinson, Caspar Bauhin, and Chabreus, together with the exact references of the descriptions and illustrations in existence; in the case of "Arch. Angelica" there were no less than fifteen authorities cited. In other entries, he noted whether a cited figure agreed well with the actual plant, for example, in the case of Pona's pine-leaved Candy knapweed, he wrote, "Dr Plukenet's Figure (which he took from Sir George Wheeler's specimen) very well agrees with the Pattern which Dr Sherard sent me from Smyrna A.D. 1705. Prosper Alpinus's also is well cut."²¹⁴

Amongst the Petiver papers, two names turn up frequently, those of William Sherard and Samuel Dale. Sherard's brother James was an apothecary, and administered William's trust for the founding of a chair of botany at Oxford so efficiently and faithfully that the university awarded him an MD in 1731. James Sherard was by no means a negligible botanist himself, and had a very fine garden at Eltham, Kent.

Samuel Dale (1659–1739) was another apothecary/botanist of note. Although

²¹⁰ British Library, Sloane MSS. MS. 4063, f. 51, letter from Starrenberg wanting more papers for drying plants; MS. 3321, f. 220, letter from James Cuninghame saying he had received copies of Petiver's 'Centuries and Tables'; MS. 3321, f. 110, letter from Edward Bulkeley requesting a "neat box for specimens" and "Mr. Raye's 3^d volume of Pl."

²¹¹ Lankester (editor), op. cit., note 204 above, p. 403. Letter written by Ray to Petiver in 1702.

²¹² P. A. Saccardo, 'Petiver's exsiccatae', *J. Botany*, 1899, 37: 227.

²¹³ *Phil. Trans.*, 1714, 29: 229, 238.

²¹⁴ *Ibid.*, pp. 237–238.

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apprenticed in London, he practised in Braintree, Essex, and never claimed his freedom. There is no doubt that he acted as both physician and apothecary because Ray, in the preface of his *Historia plantarum* (1686) alludes to him as “D. Samuel Dale, Medicus et Pharmacopaeus vicinus et familiaris noster...”. Dale’s *Pharmacologia* (1693) ran to three editions in his lifetime and many more after his death; it is usually regarded as the first systematic materia medica. He sent many communications to the Royal Society and to John Haughton’s *Collections for the improvement of trade and industry*, and wrote a large and useful appendix to Silas Taylor’s history of Harwich and Dovercourt. Like Petiver, he endeavoured to give each specimen in his collection every synonym known to him, and his descriptions are extremely detailed and accurate.

The number of apothecaries quite seriously involved in the study of botany was large, ranging from Joseph Andrews of Sudbury, Suffolk, a friend of Dale, to John Blackstone (1712–53), who wrote a catalogue of the plants of Harefield, Middlesex, to Thomas Halfhyde of Cambridge, John Wilmer of the Chelsea Physic Garden, and William Watson, better known for his work on electrostatics. Rather more note must be taken of Richard Pulteney (1730–1801).

From an early age, Pulteney evinced a keen interest in botany. He wrote in the *Gentleman’s Magazine* on the “seeds of fungi” (1750), the styptic agaric (1751), poisonous plants, acacias, the use of botany in agriculture, and the feeding of cattle; and in the *Philosophical Transactions* on rare plants in Leicestershire, the sleep of plants, belladonna, and a historical memoir on lichens. He published two important works, *A general view of the life and writings of Linnaeus* (1781)²¹⁵ and his two-volume *Historical and biographical sketches of the progress of botany from its origin to the introduction of the Linnean system* (1790). Such a work as the latter had never been attempted before, Pulteney had originally intended it as an introduction to a flora Anglica, which exists only in manuscript form. It proved immensely popular and is still widely quoted.

Dr Watson put Pulteney in contact with two notable botanists of the day, John Hill (1716–75) and William Hudson (1730?–93), both of whom were at work on preparing a British flora. Hill published many botanical works, and Richard was eager to help him in his latest project, sending him notes, seeds, and specimens. He was grievously disappointed in the results. He wrote to his uncle, “I have laughed very heartily at your burlesque of Hill by calling him very properly a lillocking wretch. . . . I could almost wish I had never taken mine, for it will absolutely be of no use to me. . . .”²¹⁶ For Hudson, he had the greatest respect.

William Hudson was born at the White Lion inn, Kendal, which was kept by his father. After education at Kendal Grammar School, he was apprenticed to a London

²¹⁵ Pulteney is always regarded as a zealous supporter of Linnaeus, and so it is interesting to note what he wrote to John Hill around 1758: “For my own part though I like the sexual scheme in as much as it is simple and the classical characters and orders easy to retain in the memory, yet I confess I have so great a regard for the Natural Classes of plants however imperfectly they be known at present that I would rather wish to have the artificial character dispensed with then the natural.” From a rough collection of notes and copies of letters sent to Hill amongst the Pulteney letters, Library of the Linnean Society.

²¹⁶ Pulteney correspondence, *ibid.*, letter to G. Tomlinson, 15 February 1757.

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apothecary, George Otway.²¹⁷ Like William Watson, he gained the prize for botany that was awarded by the Apothecaries' Company, a copy of Ray's *Synopsis*. In 1757, even before he obtained his freedom from the Society, he became resident sub-librarian at the newly formed British Museum; there, he studied the collected herbaria of Hans Sloane, which enabled him to make an adaptation of the Linnean nomenclature to plants named in the Ray era. By 1762, the year when the first edition of his *Flora Anglica* appeared, Hudson was practising as an apothecary in Panton Street, the Haymarket. This publication is usually regarded as marking the establishment of Linnean ideas. From 1765 to 1771, he was "praefectus horti" at the Chelsea Physic Garden.

Coming at the end of our period are William Sole (1741–1802) and William Curtis (1746–99). Sole was born at Thetford, the eldest son of John Sole and Martha, daughter of John Rayner, banker of Ely. He was educated at the King's School in Ely, and, in 1758, was apprenticed for five years to Robert Cory, apothecary of Cambridge, to whom the *Dictionary of National Biography* has given the courtesy title of "Dr. Cory".²¹⁸ Soon after he came out of his time, he went to Bath, and, at a later date, entered into partnership with Thomas West. He travelled widely in search of British plants and had a fine garden. He wrote a flora of Bath, an account of the commonest English grasses, contributed papers to the Bath and West of England Agricultural Society, and in 1789 published his *Menthae Britannicae*. He was a correspondent of William Curtis and sent specimens to his gardens. On 1 May 1777, Sole wrote to him, "Dear Sir, I suppose you are equally distracted between Botany and Business as myself, therefore can easily account for your long silence."²¹⁹ In this he was probably wrong, because Curtis allowed little to disturb him from the pursuits that really interested him.

William Curtis, a Quaker from Alton, came from a family with a strong medical tradition; his grandfather, uncle, two brothers, and cousin were all surgeons and apothecaries. After five years' training with his grandfather, John Curtis, he came to London to spend one year with George Vaux, a member of the Surgeons' Company, and then two more with Thomas Talwin of the Apothecaries' Society. He gained his freedom in 1771, and it is usually said that he inherited Talwin's practice at that time, but an examination of Talwin's will made on 27 August 1774 shows this to be incorrect.²²⁰ In 1771, however, Curtis started in Bermondsey his first garden for the culture of British plants, in conjunction with Thomas and Benjamin White, the brothers of Gilbert White of Selborne. This botanical garden was succeeded by a larger one at Lambeth Marsh and another at Charlton, Kent. The first number of his *Flora Londinensis* was published in May 1775, a flora which he hoped would

²¹⁷ Guildhall Library, Apothecaries' Society court minutes, MS. 8200/7, ff. 24, 130. He gained his freedom on 4 July 1758; *DNB*, vol. 28, p. 155.

²¹⁸ Robert Cory was the son of John Cory of Landbeach, Cambs., and was apprenticed to Hugh Trimnel, citizen and apothecary of London, a cultured man who subscribed to such books as Thomas Uvedale's, *Memoirs of Philip de Commines*.

²¹⁹ W. H. Curtis, *William Curtis, 1746–1799*, Winchester, Warren, 1941, p. 29.

²²⁰ PRO, PCC, Prob. 11 – 1030, f. 187, April 1777. He wrote that he bequeathed to his brother John, "... the house in which I now dwell formerly known by the sign of the Black Swan and Harrow, but now by Number 51, situate between the parishes called St. Bennett Gracechurch and St. Leonard Eastcheap, and belonging to both parishes, in Gracechurch St. . . ." There is no mention of William Curtis.

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eventually cover the whole of Britain; it was a fine attempt, but proved a financial burden. It was followed by his *Botanical Magazine* in 1787, which, though an inferior production, became an immediate success, soon achieving a monthly sale of 3,000 copies. In this respect, he was a worthy follower of James Petiver, although an almost total failure as demonstrator at the Chelsea garden, a post he held in a disorganized fashion from January 1773 to August 1777.

The English botanist-apothecary did not produce a John Ray or a Carl Linné, not even a De Jussieu or a De Candolle, a Malpighi or a Grew, but they were excellent men of the second rank, and as communicators on a regional, national, or international basis they could scarcely be bettered.

CHEMISTRY

Since chemistry is one important component of pharmacy, it is understandable that apothecaries should not only have been drawn to it but also have contributed significantly to its development. The work of continental chemist-apothecaries was of major importance, and a very impressive list can be compiled from France, Germany, Denmark, and Sweden. Their work is all the more remarkable when it is realized that most of these apothecaries were not full-time academics but working pharmacists. Scheele and Sertürner conducted their experiments in the apothecary laboratories; Klaproth was fifty before he went to the Prussian Academy of Sciences; Caventou and Pelletier both ran pharmacies as well as being professors of pharmacy at the Paris school of pharmacy.

In England, the story was very different. The situation was so bad that the young T. N. R. Morson, when he wished to study the new and rapidly developing subject of phytochemistry in 1818, had to travel to Paris and there work in the pharmacy of L. A. Planche in the Rue de Mont Blanc. How much can justifiably be claimed for English pharmacy in the development and subsequent work of Humphry Davy (1778–1829) and W. T. Brande (1788–1866) is doubtful. Mr Edward's laboratory at the Hayle Copperhouse was far superior to that of Bingham Borlase, Davy's apprentice-master; Brande's background was at least as much Hanoverian as it was English, and it is probable that Uncle Johann Conrad's court pharmacy at Hanover was of far greater stimulus to him than that of his unsympathetic brother in London. A better case can be made for the Henry family and for William Watson.

Watson's claim to fame in his own day was principally as a botanist and physicist; nevertheless it is not totally irrelevant to discuss here his scientific contributions. He was born in 1715, and was apprenticed in London to an apothecary called Thomas Richardson in 1731.²²¹ Immediately he was out of his time, he set up in practice in Aldersgate Street. His interests first lay with botany, but he soon turned to the investigation of the newly discovered phenomenon of electricity. He was elected to the Royal Society in 1741, and four years later received the Copley medal for his researches, an award which was given to Benjamin Franklin for the same subject in 1753. Watson's laboratory became a fashionable resort for members of the court and

²²¹ Guildhall Library, Apothecaries' Society court minutes, MS. 8200/6 f. 61v. He was later turned over to John Lyde, warden.

In 1806, Davy firmly linked the phenomenon of electricity to chemistry, believing that chemical affinity was governed by the same laws as those that operated in electrical attraction and repulsion.

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others to see his more spectacular experiments.²²²

He read some sixty-two papers to the Royal Society, which were subsequently published; about half of them were on his own speciality. He is seen to be a careful, systematic, and observant experimenter, and made such valuable, if not momentous, observations – as that electrical discharges are not affected by colour as some averred, or that an electric field can pass through glass, even through more than one glass separated from another by a considerable air gap, or that electrostatic attraction can overcome the force of gravity in light bodies. He was in close contact with the Continental experimenters, including Le Monnier and the Abbé Nollet of Paris, Professor Musschenbroek of Leiden, Mr Allamand and Professor Bose of Wittenberg, and excelled as a communicator of their researches.

He advanced along with Nollet and Bose in their belief that Du Fay's dualistic theory of two types of electricity should be replaced by the unitary one. He was generous in his praise of the significant work of others. In 1753, he summarized the recent discoveries by saying, "Since Mr Gray discovered that bodies must be insulated to communicate to them a perceptible electric virtue. . . . This thought [of placing iron bars in the sky against lightning] could not have happened but to those who had taken notice of the analogy between lightning and electricity . . . and no one could think seriously upon this analogy but since the discovery of the experiment of Leyden in 1746." He made these remarks when reading a letter from Nollet, who defended his own views and refuted Franklin's assertion that ". . . electrification of pointed bodies is a proof of lessening the matter of thunder." Watson faithfully translated his old correspondent's views, but it is obvious he was not in full agreement with him and stated that ". . . the discoveries made in the summer of 1752 . . . will make it memorable in the history of electricity."²²³

Watson was a great protagonist of the use of lightning conductors, particularly for gunpowder magazines and ships at sea. He sat on the committee set up in 1772 to decide whether a pointed or a rounded rod was the better lightning conductor; he, with Henry Cavendish and John Robertson, came down firmly for the former.²²⁴ By this time, William Watson was no longer an apothecary. In 1757, he gained MDs from both Halle and Wittenberg universities and was disfranchised from the Society of Apothecaries when he was forty-two. Within a short time, he moved from Aldersgate to Lincoln's Inn Fields, became a licentiate of the College of Physicians after examination in 1759, and was elected fellow in 1784. Attempts are made to claim him for the physicians, but as he acted for half his professional life as an apothecary, this is not entirely reasonable.

It is interesting to note that Watson's Aldersgate practice was taken over by Timothy Lane, apothecary and FRS. It is probable that they were close friends, as he too was interested in electrical apparatus and sat on one of the committees in the famous lightning conductor controversy.²²⁵ Lane is better known for his experiments on the rusting of iron, in which he demonstrated the two essentials of rusting,

²²² *DNB*, vol. 60, pp. 45–47.

²²³ *Phil. Trans. R. Soc. Lond.*, 1753, 48: 201–216, see pp. 201, 210.

²²⁴ *Ibid.*, 1773, 68: 66.

²²⁵ D. W. Singer, 'Sir John Pringle and his circle', *Ann. Sci.*, 1949–50, 6: 127–180, see p. 171.

that iron is dissolved to a colourless solution by dissolved carbon dioxide, and that this solution deposits a yellow rust on exposure to air.²²⁶

Of the scientific Henrys of Manchester, Thomas Henry (1734–1816) was the first. He was born in Wrexham, the son of a dancing-master and possible schoolmaster who some have thought to be the illegitimate son of Viscount Bulkeley.²²⁷ Thomas was educated at Wrexham Grammar School and, like his younger brother, it was intended that he should study at Oxford, but family tradition says that at the last moment it was decided his father's financial resources were unequal to the expenses involved. He was apprenticed to Richard Jones, apothecary of Wrexham, for seven years from 14 December 1751.²²⁸ Jones died within a few months and Henry became the apprentice of Henry Penny of Nether Knutsford, apothecary.²²⁹ Penny or Pennee was the son of Robert Penny, apothecary of the same town and Clare, daughter of William Trafford Esq., of Swythamley, Staffordshire; his twin brother Edward (1714–91) was a fashionable painter, one of the foundation members of the Royal Academy of Arts and its first professor of painting. It is intriguing to see that amongst the last paintings he exhibited in 1782 were 'The Benevolent Physician' and 'The Rapacious Quack'.²³⁰ When Thomas was out of his time, he became an assistant of Mr Malbon, an apothecary of Oxford, almost certainly either Ralph or John Malbon, who had been apprentices of Robert Penny in the 1720s.²³¹

Later in life, Thomas Henry said his interest in chemistry was first aroused by reading Boerhaave's *Elementa chemiae*. According to Farrar *et al.*, "... Boerhaave and the dispensary were the best education in chemistry he could have had; no university could have taught him more."²³² When in Oxford, he took the opportunity of attending a course on anatomy, and what was to prove of greater monetary worth, became acquainted with an apothecary called Samuel Glass who had a small magnesia factory on Cowley Marsh. Glass made a particularly fine variety of magnesia, the secret of which Henry learnt by methods that may or may not bear inspection. Malbon offered him a partnership, but he preferred to return to Knutsford, where in 1760, he married Mary Kinsey, who is thought to have been a relative of the Pennys. Their first child was born in Knutsford in 1763, and the following year they migrated to Manchester, then on the verge of its industrial expansion.²³³ He established himself in the fashionable district of St Ann's Square, and seems to have rapidly made a

²²⁶ T. M. Lowry, *Historical introduction to chemistry*, London, Macmillan, 1926, p. 108.

²²⁷ W. V. Farrar, K. R. Farrar, and E. L. Scott, 'The Henrys of Manchester', Part I, *Ambix*, 1973, 20: 183–208, see p. 183*n*.

²²⁸ PRO, Inland Revenue apprenticeship records, I.R./1/51, f. 102. Premium £31 10*s*. Jones was a well-respected apothecary and trained at least three other apprentices.

²²⁹ *Ibid.*, I.R./1/51, f. 230. Premium £50. The Penny family of apothecaries were well known locally. Henry trained at least four other apprentices including George Bew; and his father, Robert, five.

²³⁰ *DNB*, vol. 44, p. 335.

²³¹ *Op. cit.*, note 228 above, I.R./1/47, f. 195; I.R./1/48, f. 203. Premiums were £30 in both cases.

²³² Farrar *et al.*, *op. cit.*, note 227 above, p. 185.

²³³ Robert H. Kargon, *Science in Victorian Manchester*, Manchester University Press, 1977. Glass's magnesia still had a market many years later, as can be seen from an advertisement in the *Sheffield Iris*, 27 April 1830: "The Magnesia. Prepared from the recipe of the late Dr. Glass is the purest and most freed from saline and heterogeneous particles of any magnesia now made. Mr Delamotte last year assigned all his interest in the above property to E. Edwards, chymist, 67, St. Paul's Church yard . . ." Glass also contributed to *Phil. Trans.*, 'Case of an uncommon dropsy from the want of a kidney . . .' (1749, 44: 733).

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success of his practice. In 1772, he began magnesia production. At first, like Glass, he made magnesium carbonate, but soon found that the oxide was even more satisfactory; weight for weight, it was more effective and, more important, did not lead to the distressing evolution of gas. He discovered also that he could produce an easily dispersible powder if he heated the carbonate in a certain fashion, which was kept a closely guarded secret. It had a tremendous vogue and was manufactured until 1933 when the firm of T. & W. Henry was sold to British Drug Houses.

Henry played a major part in the founding of the Manchester Literary and Philosophical Society in the 1770s and taught "Chemistry, with a reference to Arts and Manufacture" at the College of Arts and Sciences. He remained faithful to Boerhaave's teachings, so that his lectures had an old-fashioned air; however, he was well aware of Lavoisian theories, as he had translated Lavoisier's *Opuscules*. Later, he lectured in chemistry at the Manchester Dissenting Academy. In the midst of this busy life, he also carried out chemical research, not of any outstanding innovative value but what might be described as "sound". He was particularly concerned with the relationship of carbon dioxide to putrefaction and fermentation, but, being unaware that the activity of micro-organisms was taking place, he reached some confusing conclusions. He also carried on experiments, first in conjunction with Dr Percival, and then alone, into the interaction between "fixed air" and green plants. Their results contraverted those of Priestley, but it is probable that the differing observations were due to the fact that neither party had any conception of the role of sunshine in photosynthesis.

Henry was first and foremost a practical chemist. He became active in the important textile trade, being one of the first people in Britain to use chlorine for bleaching cottons, and developed a "milk of lime", a forerunner of bleaching powder. He was also very interested in the dyeing industry, and seems to have had a good appreciation of the action of a mordant. He had a great faith in the uses to which chemistry could be put, and continued to be interested in new theories. Almost reluctantly, probably because of his friendship with Priestley, he came to accept fully Lavoisier's "new chemistry", and, certainly by 1797, had parted company with Priestley's views. Thomas Henry was certainly no great chemist, although his son William comes nearer to being placed in that category.

The contribution of English apothecaries is by no means impressive, but Crellin has shown that British medicine and pharmacy have made significant additions to the development of chemistry in the period immediately prior to the general acceptance of professional chemists through education and the search for more uniform or new medicines.²³⁴

MEDICINE

Advances in medicine during the Scientific Revolution were slow when compared with those in astronomy and physics, and even botany. Thomas Sydenham seems to have been aware of this and made many references to the work of the botanists who were so active in making collections, developing acceptable terminologies and systems

²³⁴ J. K. Crellin, 'The development of chemistry in Britain through medicine and pharmacy, 1700–1850', unpublished PhD thesis, London University, 1966.

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based on morphology, which culminated in the achievement of John Ray. Sydenham wrote that in order to effect cures, “. . . all diseases must be reduced to definite and certain species like the phytologies of botanists”, a not inapt comparison.²³⁵

Although the great Sydenham can by no means be claimed to have been an apothecary, he was equally no product of the conservative medical schools of the two English universities. He spent a bare year and two months at Oxford and was voted an MB by Convocation in April 1648, principally because he was a fervent supporter of the Parliamentarians. Sydenham had no patience with medical education as taught at Oxford and thought apprenticeship a far sounder method.²³⁶

The surgeon and apothecary, as has been noted, was the general practitioner of the day, but the future physician's first steps in medical training were as likely to be an apprenticeship to such a man as immediate admission to university. Not only was it a common and frequently preferred approach, but it produced first-class medical men like Jenner, Withering, and Fothergill. Nobody understood the importance of this practical training more than the apothecaries themselves, especially if it could be combined with some hospital experience.

Henry Lampe, an apothecary of Ulverston who died in 1711, wrote in his will, “It is my will and mind, that in case my son Ephraim Lampe when he cometh to years of discretion, incline to betake himself to ye study and practice of physic, that he bee putt betimes to a good apothecary in a country town, . . . where they have a deal of business for making up of doctors' bills and for visiting of patients, for three or four years, after which time I would have him frequent some good hospital, where hee may see and learne surgery. . . .”²³⁷ William Watson, previously an apothecary, in a letter to Richard Pulteney in 1762, agreed that his recent appointment as physician to the Foundling Hospital would give him extra work at a time when he was already very busy, but he was glad to have the post as it would prove so useful in his son's medical education, “. . . an hospital of all places is the most proper for the instruction and observation of a young physician.”²³⁸

John Fothergill (1712–80) was amongst the first to have apothecarial training extended by some years of university life, which was completed by attaining an MD. When he was sixteen, he was bound to Benjamin Bartlett (I) (1678–1759) of Bradford, Yorkshire, proceeded to Edinburgh in 1734 and qualified MD two years later.²³⁹ In order to extend his experience, he planned, as he wrote to his father in June 1735, “. . . to engage in my summers work here [Edinburgh] but was not permitted. I am now thinking of spending the three ensuing months at London either in one of the best shops there or in one of the Hospitals . . . I propose to go by sea . . . [and] when I get to

²³⁵ Franklin, *op. cit.*, note 131 above, p. 135.

²³⁶ K. Dewhurst, *Dr Thomas Sydenham (1624–1689)*, London, Wellcome Historical Medical Library, 1966, p. 17.

²³⁷ A. Raistrick, *Quakers in science and industry*, Newton Abbot, David & Charles, 1950, p. 278.

²³⁸ Linnean Society, Pulteney correspondence, letter to Richard Pulteney from William Watson, 11 December 1762.

²³⁹ B. C. Corner and C. C. Booth (editors), *Chain of Friendship*, Cambridge, Mass., Belknap Press of Harvard Univ. Press, 1971, p. 10. Bartlett was a bookseller as well as an apothecary. Like the Fothergills and the Sutcliffes, he was a Quaker, and his home was for many years a licensed Friends' meeting-house. Besides his own son, Fothergill, and William Hillary, he trained a number of other apprentices and justified the remark of Gilbert Thompson that, “His house might be called the seminary of ingenious physicians.”

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London either to attend on Sil. Bevan's shop or get to be an assistant in one of the Hospitals."

After Edinburgh, John Fothergill spent some two years at St Thomas's Hospital under Dr Mead's son-in-law. No physician shows greater evidence of his early pharmaceutical training. Until the mid-eighteenth century, the formulation of emulsions was poor, egg yolk being most commonly used, which frequently caused the preparations to become rancid, and was also expensive. After his attention had been drawn by Dr Rutty of Dublin to the possibilities of mucilage of gum arabic, Fothergill and James Bogle-French, the apothecary who had succeeded to Benjamin Bartlett (II)'s practice in Red Lion Square, London, carried out a number of experiments on emulgents, and related the results to the Medical Society of Physicians in 1757; gum arabic proved the most effective, followed by quince seeds, gum tragacanth, and syrupus altheae. Fothergill had a keen interest in pharmacognosy and is credited with the introduction of the astringent gum kino. He was aware that extracts could vary in efficacy, and realized that it was important that the plant should not be gathered before it had reached its peak of medicinal activity, and that the minimum heat possible should be used in the preparation of the extract. He eschewed the complex preparations of the day, preferring to replace them with simpler but well-prepared compounds supported by a wholesome diet, moderate exercise, and fresh air.

Fothergill made no great discoveries, in fact, his work sounds rather mundane, but the beneficial effects of his common-sense approach should not be underestimated. His friend, disciple, and biographer, John Coakley Lettsom (1744–1815), had a similar medical training and outlook. He started a five-year apprenticeship in 1761 with Abraham Sutcliffe, apothecary and surgeon in Settle, Yorkshire, and then at the urging of Fothergill went as a dresser to Benjamin Cowell at St Thomas's Hospital.²⁴⁰ In 1768, he travelled to Edinburgh for a few months, but graduated from Leiden the following year. A practical philanthropist, he is mainly remembered for his part in the development of three projects, the birth of the dispensary movement, the Royal Sea Bathing Hospital at Margate, and the Medical Society of London. This broadly-based medical society was established with the object of publishing papers, setting up a library, and encouraging medical innovation. All his life, Lettsom had a fond regard and respect for his old apprentice-master, a regard which he seems to have extended to other apothecaries, as he was determined that the new society should include all branches of the medical profession. Soon after its first meeting on 19 May 1773, the numbers were fixed at thirty physicians, thirty apothecaries, and thirty surgeons; all had to be qualified and none the proprietor of a nostrum. Fothergill and Lettsom were never anything else than physicians but they did not forget the lessons of their youth, gained from highly respected apothecaries.

An outstanding medical discovery of the eighteenth century was the use of foxglove in dropsy, not only for the discovery itself but because of the scientific approach to devising its dosage, preparation, and modes of administration. The discoverer was William Withering (1741–99), physician, but another whose initial medical training

²⁴⁰ Sutcliffe was a cultured man who had a fine library and could read Latin and French with ease. He had been the apprentice of John Ecroyde, surgeon and apothecary of Kirkby Kendal. Sutcliffe had at least six other apprentices besides his own son and Lettsom.

had been with a country apothecary, in this case his father, Edmund, who practised in Wellington, Shropshire.²⁴¹ William may have been for a time with his mother's brother, Dr Brooke Hector of Lichfield, to whom, with his first tutor the Rev. Henry Wood, he dedicated his thesis. When Withering was twenty-one, he travelled to Edinburgh, where he was taught by William Cullen, Alexander Monro *secundus* and John Hope. He graduated in 1766. Like his apothecarial forebears, Withering had a keen interest in botany, something which was to serve him well in life.

The great scourge of the eighteenth century was smallpox and much effort was expended in its prevention and treatment. The story of inoculation shows periods of great enthusiasm and others when it was repudiated. The city of Salisbury imposed a ban on the procedure in 1723. Dr James Jurin, in his *An account of the success of inoculation in Great Britain for the year 1726*, claimed that only 1 in 99 of inoculated children died of smallpox as compared with 1 in 14 of those who were not, figures largely supported by Richard Mead in 1747. In 1756, the College of Physicians came out in favour of the practice, yet it was work in which the surgeons and apothecary-surgeons were primarily involved. These men were not content merely to take their fees, but often went into print, told of their experiences, and expounded their beliefs. Some were well known in the world of surgery, like William Bromfield at St George's Hospital; others were quite obscure, such as the surgeon-apothecary Benjamin Chandler (1737–86) of Canterbury, or the apothecaries John Chandler of the City (1700–80) and John Covey of Basingstoke. Their papers were of some merit and worthy of consideration along with those of men such as Dr (later Sir) George Baker, a product of Cambridge and student of William Heberden.²⁴²

Claude Amyand, John Ranby, and Caesar Hawkins, all royal surgeons, were well-known inoculators, but the most famous were the Sutton family and Thomas Dimsdale. The Suttons were initially country general practitioners until the father, Robert, announced in 1757 that he had developed a new, safe, and infallible method of inoculation; in eleven years he claimed to have inoculated 2,514 people with great success. He trained his two sons, Robert and Daniel, in his procedure, whereupon they moved from Debenham, Suffolk, and opened an inoculation house near Ingatestone, Essex. They refused to divulge their methods until 1796 – when it was almost too late for many to be interested – and then demanded half the receipts. Their success seems to have been based on a careful selection of patients, minimum actual inoculation and a sensible quiet regimen; also in the course of their work they had probably unwittingly obtained and carefully perpetuated an attenuated strain of virus.²⁴³

Like the Suttons, the Dimsdales are usually described as surgeons. They are first located in Hoddesdon, Hertfordshire, in the person of Robert Dimsdale. His elder

²⁴¹ PRO, Inland Revenue apprenticeship records, I.R./1/49, f. 248. Edmond, son of William Withers [sic] of ye Hill, Salop, was apprenticed to George Hector, surgeon, of Lillishall Lodge, Salop, for five years from 29 September 1730. In his turn, Edmond had at least four apprentices, including Benjamin Hector in 1768. Edmond Withering married Sarah Hector, sister of Dr Brooke Hector of Lichfield.

²⁴² W. Bromfield, *Thoughts arising from experience concerning . . . the smallpox*, 1767. He was the son of Thomas Bromfield MD (Oxon.) and brother to James, apothecary in Soho. B. Chandler, *An essay towards an investigation . . . of inoculation*, 1767. J. Chandler, *A discourse concerning the smallpox, occasioned by Dr Holland's essay*, 1761. J. Covey, 'Further observations & facts relative to . . . inoculation . . .', *Lond. med. J.*, 1787. G. Baker, *An inquiry into the merits of a method of inoculating the smallpox*, 1766.

²⁴³ D. van Zwanenberg, 'The Suttons and the business of inoculation', *Med. Hist.*, 1978, 22: 71–82.

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son, John, settled in Hertford, and both his sons are said to have had an MD.²⁴⁴ A medical career was a strong tradition within the family. Robert's younger son, his namesake, an early convert to Quakerism, crossed the River Lea to practise as a surgeon in Theydon Gernon, where he was in trouble in 1663 for working without a bishop's licence. In the next generation, both his sons, John and William, also became surgeons. John took over his father's practice, and William moved to Bishop's Stortford, where he was mentioned as a surgeon in 1715. William's branch gave rise to the bankers and surgeons of Hitchin, whilst John at Theydon became the father of Thomas, the best known of the family and the most famous of all inoculators.²⁴⁵

Born in 1712, Thomas was his father's pupil until John died; he then went to study under Joshua Symonds and John Girle, surgeons of St Thomas's Hospital. He settled in Hertford, where a relative had left a high medical reputation, and became a remarkably successful inoculator. Unlike the mercenary Suttons, he published his methods for the benefit of mankind in 1767, and it can now be seen that their procedures were exceptionally similar. In 1761, when he was forty-nine Dimsdale graduated MD of King's College, Aberdeen.

From the earliest years, it was recognized that inoculation smallpox was just as contagious as natural. Dr Richard Beard of Worcester told Jurin that he would like to see the infirmary for inoculation established *outside* the town, but it is doubtful if any true isolation was enforced until the days of John Haygarth (1740–1827), physician of Chester. By the 1750s, private inoculation hospitals for the care of patients for five or six weeks, usually owned by the inoculator and under his sole jurisdiction, were established institutions. One of the earliest was that of Thomas Frewen (1704–91) of Rye, Sussex. There he practised as an apothecary and surgeon, and set up an inoculation hospital.²⁴⁶ He published in 1749 his *The practice and theory of inoculation*, in which he narrated his experience of 350 cases amongst which there had been only one death. He laid great stress on the patient's constitution and tailored his preparative treatment accordingly. He advanced the theory that smallpox and many other diseases were propagated by animalcula hatched from eggs lodged in the hairs and pores of human bodies. The treatise was "latinised", and on the strength of it he received an MD from Utrecht. In 1759, he published another carefully reasoned paper in which he showed that the development of smallpox after exposure to infection could not be checked by the administration of Aethiops mineral, which had been the opinion of Boerhaave. Both Frewen and Dimsdale, on the strength of their MDs gained in middle age without any further periods of formal study, are often claimed to be physicians, but the grounds for this are flimsy.

Vaccination or deliberately induced cowpox (vaccinia) was without doubt known in the West Country in the early eighteenth century and probably in most dairying

²⁴⁴ R. H. Fox, *Dr John Fothergill and his friends, chapters in eighteenth century life*, London, Macmillan 1919, p. 82. Robert Dimsdall [*sic*] was admitted pensioner at St Catherine's, Cambridge, 5 March 1679 and became MB (1684) and MD (1696). The MD of his brother, Sir John, has not been traced.

²⁴⁵ William's grandson, John, was apprenticed to John Midwinter, apothecary of Hitchin in 1757.

²⁴⁶ G. Miller, *The adoption of inoculation for smallpox in England and France*, Philadelphia, University of Pennsylvania Press, 1957, p. 166.

districts such as Leicestershire and Cheshire.²⁴⁷ A man who is almost out of our period, Edward Jenner (1749–1823), brought it to the notice of the “establishment”. It should be noted that his training in medicine was little different from many of the men mentioned above. The son of a clergyman, he was apprenticed to George Hardwicke, surgeon and apothecary of Chipping Sodbury, for seven years on 1 August 1764.²⁴⁸ In 1770, he went to London to become a student of John Hunter and to listen to the lectures of George Fordyce and Thomas Denman. By the end of 1772, he had returned to Gloucestershire to practise as a general practitioner. It was not until he moved to Cheltenham in 1790 that he decided to turn physician and busied himself with pursuing a degree. He received an MD of St Andrews University on 8 July 1792, on the recommendation of J. H. Hicks MD of Gloucester and C. H. Parry MD of Bath, when he was forty-three.

Midwifery, with the notable exceptions of the Huguenot Chamberlen family, William Harvey, and his friend Percival Willughby, commanded little academic interest until the early decades of the eighteenth century. From the parish poor law accounts, it is known that the surgeons and apothecaries employed by the authorities not infrequently “laid a woman” (see p. 34), so it is no surprise that this new concern arose in the main amongst these general practitioners.

Edmond Chapman (fl. 1708–37) of Halstead, Essex, and London, and Benjamin Pugh (fl. 1738–75), of Chelmsford, both surgeons and apothecaries, were clever exponents of the use of the delivery forceps and wrote noteworthy books on midwifery. The Scotsman, William Smellie (1697–1763), who has been called “the master of British midwifery”, was a surgeon and apothecary in Lanark until he came to London in 1738.²⁴⁹ He did not graduate MD from Glasgow until 1745, when he was forty-seven, and thereafter continued to practise the manual art of an obstetrician. The denigrations by his detractors notwithstanding, he was a man of liberal education and culture.

The most eminent men in this field were probably Thomas Denman (1733–1815) and Charles White (1728–1813), two of the founders of the school of medical practitioners known as the English Contagionists. White, having had the drive and good fortune to found the Manchester Infirmary, became its chief surgeon at the age of twenty-four. He must be accounted a pure surgeon, though it is not out of place to mention that his father, Thomas White (1695–1776), practised as a surgeon and apothecary in Manchester, having been apprenticed to Edward Baker, a London apothecary, in 1712. Similarly, Thomas Denman was the son of an apothecary in Bakewell, Derbyshire.²⁵⁰ Like Thomas White, John Denman (1693–1752) taught his

²⁴⁷ The value of deliberately induced cowpox taken directly from the cow was well understood by milkers in Cheshire in the mid-1930s; vaccination by a doctor was spoken of as being a very recent development. See also, P. Razzell, *The conquest of smallpox*, Fittle, Sussex, Caliban Books, 1977.

²⁴⁸ D. M. Fisk and other authorities such as F. D. Drewitt say that Jenner was apprenticed to a Mr Ludlow of Chipping Sodbury, the dates varying from 1761 to 1763; this is not borne out by the Inland Revenue apprenticeship records, I.R./1/55, f. 122. It is probable that the Ludlow and Hardwicke families were closely linked.

²⁴⁹ H. R. Spencer, *The history of British midwifery, from 1650 to 1800*, London, Bale & Danielsson, 1927, p. 45.

²⁵⁰ John Denman came from a well-known armigerous family of Nottinghamshire, and was apprenticed to John Farrer, senior, apothecary of Mansfield in 1711; an earlier Thomas Denman of East Retford had been apprenticed to John Smyth, citizen and apothecary of London in 1657.

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son the art of an apothecary. When Denman, came to London in 1754, as he wrote in his memoirs, he “. . . had a very competent knowledge of pharmacy and knew as much of the diseases as the frequent reading of Sydenham’s works and a few other books could give.”²⁵¹ After attendance at St George’s Hospital and two anatomical courses, he became a Royal Navy surgeon. On leaving the navy after nine years, he attended further lectures in anatomy and midwifery, and attained his MD at Aberdeen in 1764, when he was thirty-one. Like Smellie, he continued in obstetrical work for the remainder of his long life.

The South-West produced a number of men of high calibre, men such as John Mudge (1721–93); the son of Zachariah, master of Bideford grammar school and prebendary of Exeter, he was a popular general practitioner in Plymouth. He wrote on many subjects: on the research into inoculation he had carried out with two other local apothecary-surgeons, Longworthy and Arscott of Plympton; on the lateral operation for the stone; and on the reflecting telescope; for this last work he received the Copley medal and was elected a fellow of the Royal Society in 1777. He introduced an inhaler for the relief of catarrh, which proved useful, and in 1784, when he was over sixty, he obtained an MD at King’s College, Aberdeen.²⁵² Rather better known today is Edward Spr[e]y, principally because of the bizarre and revolting experiments he conducted on chickens and dogs in order to prove that animals and humans can survive for an appreciable number of days, eating and drinking normally, after they have swallowed liquid lead. His paper on the subject was read before the Royal Society and published in the *Transactions*. Spry was apprenticed to George Woolcombe for five years from 1 July 1742, probably of the same family as may have supplied the apprentice-master for Mudge.²⁵³

All these men, Mudge, the Chandlers, Frewen, and Spry, had their apprentices, to whom, one hopes, they ably passed on their experience and enthusiasm. Mudge, like Bartlett and Sutcliffe in the north of England, had a veritable training school, as did his fellow-Devonian, Nicholas Tripe of Ashburton. In 1754, Tripe carried out an unusual dissection, which, in conjunction with the well-known John Huxham, he reported to the Royal Society. A body had been found in a vault of Staverton church which, although it had been buried for eighty years, was in a remarkable state of preservation. Tripe described in detail its careful dissection, concluding that the state of the body was due to the pitch- and tar-soaked cloths in which it was wrapped, and not to any miraculous agency – a conclusion that shows a suitably dispassionate scientific approach.²⁵⁴

²⁵¹ J. Denman, *An introduction to the practice of midwifery*, 7th ed., London, 1832, preface.

²⁵² *DNB*, vol. 39, pp. 254–255. One of Mudge’s brothers, Zachariah (1714–53), was a surgeon on an East Indiaman and died at Canton, whilst another, Thomas (1717–94), was a horologist of note. The Mudge and Cookworthy families were close friends; John Mudge was the master of William Cookworthy, nephew of the apothecary-discoverer of English porcelain of the same name.

²⁵³ It is not known who trained John Mudge, but George, John, and Thomas Woolcomb took many apprentices between 1730 and 1783. Munk wrote of Spry that he “was destined for the church, had a good classical education and was matriculated at Oxford but soon left university, went to Plymouth and was apprenticed for five years. . . .” (W. Munk, *Roll of the Royal College of Physicians of London*, 3 vols., London, Royal College of Physicians, 1878, vol. 2, pp. 281–283.) In this, Munk was not entirely correct. Spry received an Aberdeen MD in 1759 and a Leiden one in 1768, but did not matriculate at Exeter College, Oxford, until 12 October 1773 when he was forty-five.

²⁵⁴ *Phil. Trans. R. Soc. Lond.*, 1752, 47: 253.

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The contribution of the apothecary-surgeon to run-of-the-mill medical practice has been largely ignored, and still more has that to medical innovation; one might suspect that it has been deliberately played down, as Roberts has suggested.²⁵⁵ If a man became a credit to his profession, then the emphasis was placed on his university life – if he went to one, or to his MD – if he attained one. Lettsom is proclaimed to have been a product of Edinburgh, yet his stay there was of only a few months' duration, whilst his time in Leiden, from whence his MD emanated, was even shorter. Rook has shown that the time students spent in Leiden was much less than has been generally believed.²⁵⁶

Fine work was carried out by men of the calibre of William Heberden the elder and Francis Glisson (both of Cambridge University), and John Huxham and Richard Mead (both of Leiden University), but the contribution of the apothecary-surgeon to advances in medicine should not be ignored. There is little doubt that apprenticeship augmented by higher study, together with an intelligent and experimental approach, was one important route to medical innovation in the eighteenth century.

²⁵⁵ Roberts, *op. cit.*, note 26 above, p. 363.

²⁵⁶ A. Rook, 'Cambridge medical students at Leyden', *Med. Hist.*, 1973, 17: 256–265, see p. 264.