

Benjamin Franklin's place in the history of medicine

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ABSTRACT Benjamin Franklin's seemingly endless curiosity and his prolific contributions in diplomacy, politics, literature, and science may well justify calling him the most eminent man in eighteenth-century American life. One portion of these contributions still striking for the insights and productivity it shows was in medicine. He saw the value in inoculation against smallpox. He was aware of the placebo effect. He, in effect, launched the first American medical school. He devised a flexible urethral catheter. He identified lead poisoning as a cause of abdominal pain and peripheral neuropathy. He accurately described psoriasis well before Robert Willan. These contributions in medicine of his time were not then notably influential, but they certainly illustrate the versatility of his intellect.

KEYWORDS Benjamin Franklin, lead poisoning, medical education, mesmerism, placebos, psoriasis, smallpox.

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INTRODUCTION

There was hardly a field of human endeavour that the eighteenth-century American printer, author, diplomat and scientist Benjamin Franklin worked in without some benefit to those who came after him. Medicine was no exception as a field of his endeavour. He understood the importance of judging the effects of treatments and recognised placebo effects. His practical bents were reflected in his design of a urethral catheter and of bifocal spectacles. He supported smallpox inoculation when it was denounced by many physicians, and his data on mortality from smallpox inoculation¹ supported the earlier conclusions of Jurin,² Nettleton³ and Scheuchzer⁴ that mortality from inoculation was much lower than that with naturally acquired smallpox.⁵ These contributions may well pale in importance beside his other accomplishments in science, but they do show a man who could think beyond the orthodoxies of his time.

Franklin has become one of the most written about Americans of the early American past, not only because of his contributions in science, but also because of the service he gave to his new nation, the United States, at its birth. Detailed accounts of his prolific life are readily found in many libraries, both academic and public.^{6–10} The recently published biography by Chaplin is especially useful for its concentration on Franklin's scientific interests and activities.¹¹ An online biography is available at the Wikipedia website.¹² His place in medicine has been reviewed in two recently published papers^{13,14} and in an extended monographic account by Finger.¹⁵ Franklin's own voice is well represented in the multivolume

encyclopaedic collection of his papers published by the Yale University Press^{16a} and in a shorter collection that includes his *Autobiography*.^{16b} But what was his contribution to the history of medicine in general and therapeutic evaluation in particular?

BOSTON

Franklin's father, Josiah Franklin, and his first wife, Anne, left England in 1683 and settled in Boston, where Josiah set up a shop for producing soap and candles from animal fats. Anne died shortly after giving birth to a son in 1689, and Josiah then married Abiah Folger later that year. Josiah's and Abiah's union led to seven children born before Benjamin, who was born on 17 January 1706 (in today's Gregorian calendar; 6 January 1705 in the then-current Julian calendar). Josiah had planned that Benjamin should attend Harvard College, with a view to his entering the ministry, and so he enrolled him in the Boston Latin School as an appropriate preparation for this. When actually faced with the cost of education at Harvard, however, Josiah had to change his mind.

Benjamin worked briefly in his father's shop before becoming indentured with his older brother James, who had prepared to become a printer in Boston before the family had left England. Benjamin's penchant for, and skill in, writing surfaced not long after his brother James launched a newspaper, the *Courant*. Benjamin began to write satirical articles behind the pseudonym 'Silence Dogood' and surreptitiously got them published in his brother's newspaper. After they quarrelled over the indenture agreement, however, Benjamin fled by ship for

New York and ended up in Philadelphia in 1723. It was there that his commercial success as a printer and publisher, and his ascendancy in political life, began.

PHILADELPHIA

Franklin's prominence in Philadelphia grew rapidly after he opened his print shop in 1728. A year later, he purchased the *Pennsylvania Gazette* and expanded his publishing enterprise in 1732 by launching *Poor Richard's Almanack*. In 1730, Franklin had entered a common-law marriage with Deborah Read. She had been married to a John Rogers who deserted her and left for the Caribbean, but the unresolved question of whether Rogers had died there meant that a formal marriage could have led to Deborah being charged with bigamy. Benjamin and Deborah's son, Francis, was born two years later. Tragically, 'Franky' died from smallpox when he was four years old. Franklin had been aware that inoculation had conferred protection during an epidemic of the disease in Boston, and he had intended to have his son inoculated. This had been postponed, however, because Franky had been suffering from an episode of diarrhoea. It seems likely that this tragic loss of a very young son was part of Franklin's motivation for later promoting inoculation, in particular through his publication in 1759 of *Some Account of the Success of Inoculation for the Small-pox in England and America*.^{1,17}

Franklin's printing and publishing enterprise was hugely successful and enabled him to retire from his business in 1748. During the late 1740s and early 1750s he began to engage in public and political activities, and to study electricity. The electrical studies brought him international renown, especially his famous kite-flying demonstration of the electrical nature of lightning in 1752. His electrical studies led him to try electric shock as a treatment of paralysis.¹⁴ Some of the patients he treated showed some short-lived improvement, but Franklin was reluctant to attribute this to the electrical shocks. He wondered whether such responses were simply due to expectations of benefit from such treatment, postulating what has come to be called the placebo effect. In writing to John Pringle in 1757, Franklin noted that:

'I never knew any advantage from Electricity in Palsies that was permanent. And how far the apparent temporary Advantage might arise from the Exercise in the Patients Journey and coming daily to my house, or from the Spirits given by the Hope of Success, enabling them to exert more Strength in moving their Limbs, I will not pretend to say.'¹⁸

A measure of the renown that came to Franklin as a consequence of his studies of electricity and lightning is the number of academic honours that followed. In 1753, he received honorary degrees from Harvard and Yale. The Royal Society awarded him its Copley Medal, making him

LONDON, Feb. 16, 1759.

HAVING been desired by my greatly esteemed friend Dr. WILLIAM HEBERDEN, F. R. S. one of the principal Physicians of this city, to communicate what account I had of the success of Inoculation in Boston, New-England, I some time since wrote and sent to him the following paper, viz.

ABOUT 1753 or 54, the Small-pox made its appearance in Boston, New-England. It had not spread in the town for many years before, so that there were a great number of the inhabitants to have it. At first, endeavours were used to prevent its spreading, by removing the sick, or guarding the houses in which they were; and with the same view Inoculation was forbidden; but when it was found that these endeavours were fruitless, the distemper breaking out in different quarters of the town, and increasing, Inoculation was then permitted.

Upon this, all that inclined to Inoculation for themselves or families hurried into it precipitately, fearing the infection might otherwise be taken in the common way; the numbers inoculated in every neighbourhood spread the infection likewise more speedily among those who did not chuse Inoculation; so that in a few months, the distemper went thro' the town, and was extinct; and the trade of the town suffered only a short interruption, compar'd with what had been usual in former times, the country people during the seasons of that sickness fearing all intercourse with the town.

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FIGURE 1 This opening page of Franklin's letter about smallpox to the eminent British physician William Heberden, published by Franklin in 1759, illustrates his strong interest in the possibility of preventing smallpox attacks by prior inoculation.

its first recipient outside Great Britain, and elected him to its Fellowship in 1756. He also received honorary doctorates from the Universities of St Andrews and Oxford in 1759 and 1762, respectively.

Franklin's keen judgment in civic and political matters surfaced to the benefit of American medicine in 1751 when he aided Dr Thomas Bond in a drive to raise funds to establish a hospital for the care of indigent patients and mentally ill persons. By persuading the Pennsylvania Assembly to agree to match private donations, he and Bond were able to raise the large sum needed, and the Pennsylvania Hospital opened in 1752.^{19,20} In his *Appeal for the Hospital*, Franklin envisaged that it would serve not only as an institution for care of the sick, but also as a place for medical education.

'... the Multitude and Variety of Cases continually treated in those infirmaries, not only render the Physicians and Surgeons who attend them, still more expert and skilful, for the Benefit of others, but afford such speedy and effectual Instruction to the young Students of both Professions, who come from different and remote Parts of the Country for Improvement, that they return with a more ample Stock of Knowledge in their Art, and become Blessings to the Neighbourhoods in which they fix their Residence.'²¹

Franklin's involvement in establishing the hospital was pursued in parallel with his promotion of proposals for an

Academy for 'formal and adequate education' of 'the Youth of this Province',^{22,23} and this opened in 1751. In 1765, John Morgan arranged for the Academy to provide medical education, and the Pennsylvania Hospital served as the Academy's site for teaching clinical medicine, as had been envisaged by Franklin when the Hospital was established 13 years earlier. This separate unit was the initial form of what came to be designated the School of Medicine, University of Pennsylvania.²⁴

PARIS

The part of Franklin's activities in matters scientific that is of particular interest to users of the James Lind Library (the history of clinical trials mounted by the Royal College of Physicians of Edinburgh as a website with the internet address <http://www.jameslindlibrary.org>) was his participation in a study of the purported therapeutic capacities of 'Animal Magnetism' as practised by Mesmer and his disciples.^{25,26} Franz Anton Mesmer (1734–1815), an Austrian physician, developed the concept of animal magnetism, an ill-defined 'fluid' or 'agent of nature' that 'bathed the entire universe'. As Darnton phrases Mesmer's concept, 'Sickness ... resulted from an "obstacle" to the flow of the fluid throughout the body'. The practitioner of animal magnetism could induce 'a crisis' in subjects seeking a cure, thereby removing the 'obstacle' and restoring their health. Mesmer attempted to treat the blindness of a woman in Vienna; his scandalous failure forced him in 1777 to flee and he went to Paris to promote his concepts there.^{27,28}

Because of political implications of the magnetisers' views, King Louis XVI of France appointed a Royal Commission in 1784 to judge the legitimacy of 'Animal Magnetism, as practiced by Charles d'Eslon, a disciple of Mesmer, for its purported value as a method of cure'.^{29,30} Franklin was one of the members of the Commission, but even before his participation in the Commission's study, he was sceptical of the claims of cure by animal magnetism. In a letter to Sablière de la Condamine, Franklin comments thus:

'As to the Animal Magnetism, so much talked of, I am totally unacquainted with it, and must doubt its Existence till I can see or feel some effect of it. None of the Cures said to be perform'd by it, have fallen under my Observation; and there being so many Disorders which cure themselves and such a Disposition in Mankind to deceive themselves and one another on these Occasions; and living long having given me frequent Opportunities of seeing certain Remedies cry'd up as curing everything and yet soon after totally laid aside as useless, I cannot but fear that the Expectation of great Advantage from the new Method of treating Diseases, will prove a Delusion. That Delusion may however in some cases be of use while it lasts. There are in every great

rich City a Number of Persons who are never in health, because they are fond of Medicines and always taking them, whereby they derange the natural Functions, and hurt their Constitutions. If these People can be persuaded to forbear their Drugs in Expectation of being cured by only the Physician's Finger or an Iron Rod pointing at them, they may possibly find good effects tho' they mistake the Cause.'³¹

The last sentence in this quotation echoes the point he made in his 1757 letter to John Pringle quoted above:

'... the Spirits given by the Hope of Success [in relief from 'palsies' when treated with electrical shocks may enable] them to exert more Strength in moving their Limbs...'¹⁸

Clearly, Franklin was aware of what we now call the placebo effect.

The Commission carried out its studies, which included 'blinding' of patients as to whether a treatment was with 'animal magnetism' or not. It is possible that Franklin might have suggested testing for placebo effects, but, at present, it is not clear to what degree, if at all, the studies of the Commission were designed by Franklin.

Donaldson lists briefly the various manoeuvres used in the Commission's studies.²⁸ They can be summarised as a single-blind, placebo-controlled trial, albeit a rather simple one as judged by today's standards. In essence, the Commission's report²⁹ and the report from the Société Royale de Médecine published a few days later, concluded that animal magnetism was an ineffective and undesirable treatment.²⁸

LATER LIFE

Aside from this 1784 episode, Franklin's active engagement in scientific studies was over by the mid-1750s. He left Philadelphia for London in 1757, having been appointed by the Pennsylvania Assembly to represent its interests in a dispute with the colony's Proprietors. Through the rest of his life Franklin was either in London (for most of the years between 1757 and 1775), or in Philadelphia, active in events leading to the American Revolution, or in Paris (1776–1785) in his efforts to win French support for the war with the British.

Franklin's interests in matters medical ran through most of his long life, but aside from his attempts to treat paralysis with electricity and his involvement in the Royal Commission's study of animal magnetism, his contributions were based on personal opinions, not systematic research, and his efforts focused on practical devices, such as the flexible urethral catheter he

developed for his brother. Franklin himself suffered from episodes of gout and, in later years, complained of urinary difficulties that were probably due to a uric acid bladder stone.³² Benjamin's older brother, John, apparently suffered from a bladder stone at an earlier age, and seems to have complained about difficulties in using a urethral catheter in a letter to Benjamin. This prompted Benjamin to devise a flexible catheter.

'Reflecting yesterday on your Desire to have a flexible Catheter, a Thought struck into my Mind how one might possibly be made: And lest you should not readily conceive it by any Description of mine, I went immediately to the Silversmith's, and gave Directions for making one, (sitting by 'till it was finish'd), that it might be ready for this Post.'^{33, 34}

A footnote to this letter in Volume 4 of the *Papers of Benjamin Franklin (1959–)* notes that Franklin did not invent this kind of catheter, which may have been devised in 1720 by Francesco Roncelli-Pardino, or even earlier.

A similar urge to relieve a problem with a practical solution led Franklin to devise for himself a pair of bifocal glasses. He may have made them as early as 1779,¹⁴ but the first written record of his design of his bifocals is a letter to George Whatley:

'I ... had formerly two Pair of Spectacles, which I shifted occasionally, as in travelling I sometimes read, and often wanted to regard the Prospects. Finding this Change troublesome, and not always sufficiently ready, I had the Glasses cut, and half of each kind associated in the same Circle ... By this means, as I wear my spectacles constantly, I have only to move my Eyes up or down, as I want to see distinctly far or near, the proper Glasses being always ready.'³⁵

Franklin had the capacity to pull together numerous related observations – his own and those of others – and draw a well-focused conclusion. A good example is his view of the cause of lead poisoning, described in a 1786 letter to Benjamin Vaughn.³⁶

'When I was a boy [I heard] of a Complaint from North Carolina against New England Rum, that it poison'd their People, giving them the Dry Bellyach, with a Loss of the Use of their Limbs. The Distilleries being examin'd on the Occasion, it was found that several of them used leaden Still-heads and Worms, and that the Physicians were of Opinion, that the Mischief was occasioned by the Use of Lead.'

... In America I have often observ'd that on the Roofs of our shingled Houses, where Moss is apt to grow in northern Exposures, if there be any thing on the Roof painted with white Lead, such as Balusters, or Frames of dormany Windows, &c., there is constantly a Streak

on the Shingles from such Paint down to the Eaves, on which no Moss will grow, but the wood remains constantly clean and free from it ... I Have been told of a Case in Europe, I forgot the Place, where a whole Family was afflicted with what we all the Dry Bellyach, or Colica Pictonum, by drinking RainWater. It was at a Country-Seat, which being situated too high to have the Advantage of a Well, was supply'd with Water from a Tank, which received the Water from the leaded Roofs. This had been drunk several years without Mischief; but some young Trees planted near the House growing up above the Roof, and shedding their Leaves upon it, it was suppos'd that an Acid in those Leaves had corroded the Lead they cover'd and furnish'd the Water of that Year with its baneful Particles and Qualities.

When I was in Paris with Sir John Pringle in 1767, he visited La Charité, a Hospital particularly famous for the Cure of that Malady, and brought from thence a Pamphlet containing a List of the Names of Persons, specifying their Professions or Trades, who had been cured there. I had the Curiosity to examine that List, and found that all the Patients were of Trades, that some way or another, use or work in Lead; such as Plumbers, Glaziers, Painters, &c., excepting only two kinds, Stonecutters and Soldiers. These I could not reconcile to my notion, that Lead was the cause of that Disorder. But on my mentioning this Difficulty to a Physician of that Hospital, he inform'd me that the Stonecutters are constantly using melted Lead to fix the Ends of Iron Balustrades in Stone; and that the Soldiers had been employ'd by Painters, as Labourers, in Grinding of Colours.³⁶

Franklin's views on the cause of the common cold indicate that he was sympathetic to the view that it could result from some causative agent or agents transmitted from one person to another. In writing to Benjamin Rush, the eminent Philadelphia physician best known for his strong advocacy of blood-letting, Franklin commented thus.

'[I] am glad to hear that [Dr. Cullen] speaks of Catarrhs or Colds by contagion. I have long been satisfy'd from Observation, that besides the general Colds now termed Influenza's, which may possibly be spread by Contagion as well as by a particular Quality of the Air, People often catch Cold from one another when shut up together in small close Rooms, Coaches, &c. and when sitting near and conversing so as to breathe in each others Transpiration, the Disorder being in a certain State ... As to Dr. Cullen's Cold or Catarrh a frigore, I question whether such an one ever existed.'^{37, 38}

One detail in Franklin's interest in medical matters had to do with his skin ailment. He described it on several occasions, for example:

'The Scurf appears to be compos'd of extremly thin Scales one upon another, which are white, and when rubb'd off dry, are light as Bran. When the Skin is clear'd in the Bath, it looks red, and seems a little elevated above the sound Skin that is around the Place; but it is not sore: And in a few Hours after, it becomes dry, and feels stiffned as it were with the first thin Coat of the new Scurff...The fine Lamina seem to be formed one under another, and not to make an united thick Substance by adhering together. In rubbing them off they separate, like Talc, each having a Polish that shines.'³⁹

His descriptions have been judged by dermatologists of our time as consistent with a diagnosis of psoriasis. Franklin's description certainly did not establish psoriasis as a specific clinical entity in the literature of medicine, but it did pre-echo Robert Willan's classic description:

'The second Order of Cutaneous Diseases includes those affections which are characterized by an appearance of scales, arising from a morbid state of the cuticle, as specified in the second definition. The cuticle is not, however, the only seat of these complaints. They often originate from indurated papulae, or larger elevations of the true skin which by pressure or distension injure the texture of the cuticle, and produce thickened, irregular layers of it. The scales or crusts, thus formed, have not always been distinguished from scabs succeeding confluent pustules, or superficial ulcerations...'⁴⁰

CONCLUSION

Clearly Benjamin Franklin's most prominent place is in the history of the North American British colonies and the early United States. He remained for many years devoted to trying to develop a compromise between Britain's desires to control many aspects of its colonies and the desires of the colonists south of what is now Canada for less rigid control of their affairs by the Parliament in London. For a long time, Franklin eschewed calls for a

violent separation of the colonies from the mother country and its monarchy, because he considered himself to be a citizen loyal to the Crown. Once he became convinced that a compromise could not be reached, however, he joined the advocates of revolution and worked with them for their goals.

What is Franklin's place in the history of medicine? He held many views that would eventually be vindicated by others, for example, the nature of psoriasis and of lead poisoning and the aetiology of the common cold. Although he was aware of 'the placebo effect', I have not found any evidence that his comments on this influenced any nineteenth-century criteria for judging the effects of treatments. Even his strong advocacy of smallpox inoculation came many years after it had been advocated in Britain on the basis of analyses of numerical evidence.⁵ The one consequence of Franklin's interests in medicine that had both an immediate and a long-term influence was his key roles in establishing a pioneer hospital and an Academy in Philadelphia, which ultimately became the School of Medicine and the University of Pennsylvania. But this influence was restricted to the United States; Europe already had its own facilities for education in medicine.

I conclude that Benjamin Franklin's interests in medical matters and his keen insights are best seen, not so much as influential developments in the history of medicine, but as examples of his strong curiosity about many aspects of life and how to grapple effectively with those that were problems. In brief, he was an energetic and highly productive 'polymath' who helped to change the world in many ways.

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