Sir Hans Sloane’s Contributions to Ocular Therapy, Scientific Journalism, and the Creation of the British Museum

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Sir Hans Sloane, MD, (1660-1753) is best known today for his collections of books, manuscripts, and curiosities, which formed the nucleus of the British Museum at its creation the year he died. Sloane wrote about the eye from the level of knowledge of the most informed physicians of his day. He was a long-term editor of the first scientific journal published in English and was instrumental in establishing the type of scientific literature we depend on today.

Sloane (Figure 1) is the only individual who has been president of both the Royal College of Physicians, London, England, and the Royal Society, London (the British National Academy of Science). A man of diverse accomplishments, Sloane was physician to 3 successive rulers of Great Britain. This unique man was a friend or correspondent of many of the most illustrious individuals of his time, including Sir Isaac Newton, Sir Christopher Wren, John Locke, Edmond Halley, Robert Boyle, Thomas Sydenham, Samuel Pepys, Alexander Pope, Gottfried von Leibnitz, Antonie van Leeuwenhoek, Carolus Linnaeus, Benjamin Franklin, Francois Voltaire, and George Handel. Sloane may be less well known today than any of these men, but deserves better recognition for his role in organizing scientific communication during an age when there were few outlets for scientific discourse.

EARLY YEARS

Sloane was born in northern Ireland to a family of Scottish descent. While the name Hans is unusual for someone from the British Isles today, at the time it was fashionable. Today the London borough of Chelsea keeps his name alive in places such as Sloane Square and Hans Crescent.

He studied medicine, chemistry, and botany in London for 4 years. While there, he became acquainted with 2 men who became his lifelong friends. One was Robert Boyle (1627-1691), the chemist known for Boyle’s law. The other was John Ray (1627-1705), an important botanist. Next, Sloane went to Paris, France, for further education in medicine at the Charité Hospital and botany at the Royal Botanical Garden. This was not a good period for Protestants in France, for religious freedom was under attack. Merely publishing a book without the censor’s approval was a capital offense. Within 2 years of Sloane’s arrival in France, King Louis XIV (1638-1715) revoked previously granted liberties. One result was that he could obtain a medical degree from only one French institution, the University of Orange in Provence. Orange was a tiny principality under control of the Protestant House of Orange, based in the Netherlands. The reigning prince, William, was soon to become King William III of England (1650-1702; ruled from 1689-1702). Sloane graduated as a Doctor of Physic (medicine) with highest honors in 1683. Later he was awarded medical degrees by Oxford University, Oxford, England, and University College, Dublin, Ireland. His scholarly interests led to his election as a Fellow of the Royal Society at a young age, soon after he recrossed the English Channel to England.

In 1684, Sloane returned to London, intending to practice medicine. His friend Boyle wrote a letter of recommendation to the most famous physician in England, Thomas Sydenham, MD (1624-1689),...
praising Sloane as a scholar, anatomist, and botanist. Sydenham, a colorful character, read the letter in front of Sloane, then replied:

That is all mighty fine, but it won’t do— anatomy, botany—nonsense! Sir, I know an old woman in Covent Garden who understands botany better, and as for anatomy, my butcher can dissect a full joint as well; no, young man, all this is Stuff; you must go to the bedside, it is there alone you can learn disease.2,3

Despite the shock of this first meeting, Sydenham and Sloane got along well. While an apprentice, Sloane lived in Sydenham’s home and took care of his patients when the elder physician was unable to do so. Sydenham had only one previous apprentice. This was Thomas Dover, MD (1660-1742), who later became a notorious buccaneer and rescued Alexander Selkirk (1676-1721), the real Robinson Crusoe.4 Sloane’s future was exciting in a very different way.

In 1687 Sloane was asked to accompany the newly appointed governor of Jamaica to the West Indies as his personal physician. He was intrigued by the opportunity to be the first trained scientist to evaluate the animals and plants of this exotic land, which might be the source of valuable items. The New World had already provided quinine, maize, cocoa, tobacco, the potato, and the turkey, but no one had ever explored it in this fashion. When Sloane discussed the possibility with Sydenham, however, the response was, “No, you must not go to Jamaica: you had better drown yourself.”5 His reasoning probably related more to the politics than the merits of the project. Sloane’s good friend Ray encouraged him to go, which he did.

The voyage was the basis of 2 important books, which are still considered important sources on the diseases, inhabitants, plants, animals, and weather of Jamaica.6,7 They brought Sloane international acclaim, including election to the French Academy of Sciences, the Imperial Academy of St Petersburg, and the Royal Academy of Madrid. Numerous medical observations, including notes on many of the individuals he treated, were included. One patient was “Sir H. M.,” possibly Sir Henry Morgan (1635?-1688), the infamous buccaneer and lieutenant governor of Jamaica, who was replaced as governor by Sloane’s host on the voyage.8,9 The most popular item from this trip was Sloane’s recipe for milk chocolate (Figure 2). He found pure Jamaican chocolate inedible and added milk, creating a tasty confection which was marketed under his name for a century.

MEDICAL PRACTICE IN LONDON

The success of Sloane’s books, a fortunate marriage, influential friends, and personal charm elevated him to the highest levels of English society, science, and medicine. He was outgoing, an engaging conversationalist, kind, and friendly in an era when these traits were hardly prevalent. His circle included his friends Ray and Boyle, as well as illustrious individuals he met through the Royal Society, including the philosopher John Locke (1632-1704), the diarist Samuel Pepys (1633-1703), the astronomer Edmond Halley (1656-1742), and the scientist Sir Isaac Newton (1642-1727). Investments in cinchona bark and sugar, medical practice, and his wife’s dowry made him very wealthy.

Sloane was a physician to the 3 rulers of England who followed William and Mary: Queen Anne (reigned 1702-1714), King George I (reigned 1714-1727), and King George II (reigned 1727-1760). George I made him one of the first physicians elevated to the hereditary nobility as well as Physician-General to the Army.10 These appointments brought him immense prestige.

Treating royalty may be ego boosting and may enhance one’s reputation, but it carries some real risks. In 1717 the Prince and Princess of Wales (the future George II and Queen Caroline) became ill. The prince soon recovered but the princess suffered severely from “long swoons, frequent faintings... violent pain and stoppage in her throat.”11 Unfortunately, Sloane’s
therapy did not improve her health. Some of his critics even claimed his program, if continued, would have proven fatal. He fell out of favor temporarily.

Sloane had to be amiable, respected, and socially adept to become the only individual who has been president of both the Royal College of Physicians and the Royal Society (the oldest scientific society in Great Britain). He served as president of the Royal College of Physicians for 16 years. He was a Fellow of the Royal Society for 68 years, the longest membership ever. When Sir Isaac Newton (Figure 3), the president of the Royal Society, died, Sloane was elected his successor and served 14 years in that office.

As president of the Royal College of Physicians, Sloane helped fight an enormous public health problem: alcoholism. Mobs in the London streets had threatened “no gin, no King.” This was an era of privilege for the upper classes, but difficult times for the populous lower classes, who had few diversions. The College influenced Parliament to enact the Gin Acts, which exerted some control over the inexpensive intoxicant. As is true of most physicians, Sloane achieved no outstanding advance in medicine, but he did contribute to the foundation of science as the basis of medical diagnosis and therapy.

BOOK ON OCULAR THERAPY

Sloane’s only separately published medical work is a short book titled An Account of a Most Efficacious Medicine for Soreness, Weakness, and Several Other Distempers of the Eyes (Figure 4). It was dedicated to King George II:

This account of my most Effectual Medicine for the Cure of Sore and Weak Eyes, is now made public for the Benefit of Mankind; and most humbly Dedicated to your MAJESTY, by, Your Majesty’s Most Dutiful, and Most Obedient, Subject and Servant, Hans Sloane.

He had found a secret formulation that cured many eyes of corneal opacities, pain, and fatigue. Contrary to the practice of physicians who kept their methods a mystery and followed the maxim Artis est celare Artem [the skill is to conceal the artistry], Sloane felt it is wrong to keep medical knowledge secret. He published the following prescription:

Take of prepared Tutty [zinc oxide], one Ounce; of Lapis Haematites [ferric oxide] prepared, two Scruples [¼ ounce]; of the best Aloes prepared, twelve Grains; of prepared Pearl, four Grains. Put them into a porphyry, or Marble Mortar, and


Figure 4. An Account of a Most Efficacious Medicine for Soreness, Weakness, and Several Other Distempers of the Eyes. Title page.
rub them with a Pestle of the same Stone very carefully, with a sufficient Quantity of Viper's Grease, or Fat, to make a Liniment; to be used daily, Morning or Evening, or both, according to the Convenience of the Patient.

Sloane found the medication so beneficial that “not one in 500 missed of a Cure: unless their Disorder proceeded from a Venereal Taint.”

This prescription has been criticized for not advancing ophthalmology. In his defense, its ingredients can be beneficial. Zinc oxide is used today in ophthalmologic and dermatologic preparations for its mild antiseptic and astringent effects. Since it is not soluble in water while zinc sulfate is, the latter compound is used in ophthalmic solutions. Calamine, a pink powder that contains at least 98% zinc oxide and a small amount of ferrous oxide, is used to soothe and protect the skin. Aloe is a genus of about 200 succulent plants from the lily family that are found mainly in southern Africa. Today, aloes are used topically in cosmetics and to treat burns. Occasionally, aloes are used systemically as tonics and purgatives. Pearl, which is essentially inert, is unlikely to have any appreciable effect when ground up finely.

Viper fat is a curious item. The fact that snakes are uncommon in England makes it even more interesting. Snake flesh was used therapeutically for 18 centuries, and the practice was not discarded until the end of Sloane’s life. It was an integral component of the most famous medication in the ancient world: theriac. Theriac was considered a panacea for all illnesses, including blindness, and useful in treating all poisons. There was a large trade in snakes for medicinal use. Snakes were imported into England from eastern Mediterranean areas. At the same time as alchemists were looking for a universal element, the Philosopher’s Stone, physicians thought they had found in theriaca a universal medication, a Physician’s Stone. Theriaca became passé about 1750, when rational therapeutics began to evolve. It is useful to recall that Sir Isaac Newton, Sloane’s immediate predecessor as president of the Royal Society, maintained a long interest in alchemy.

As president of the Royal College of Physicians, Sloane played an important role in improving pharmacologic standards. In 1618, the college created the first approved list of drugs, the London Pharmacopoeia, and many revisions followed. The first edition began with medications that were in standard use. Many are humorous by today’s standards and may easily be compared with witches’ potions. Viper’s fat and pearl, both recommended by Sloane, were in the early pharmacopoeia. Also included were crab and crayfish eyes, rhinoceros and unicorn horn, elephant and hippopotamus tooth, boar urine, bezoar, earthworm, scorpion, spider webs, powdered mummy, mandrake, and precious stones. During Sloane’s presidency of the Royal College of Physicians, the fourth London Pharmacopoeia (1724) was created. With his influence, the new edition eliminated many bizarre items and gave clearer descriptions of botanical preparations.

Progress toward our current pharmacological understanding has often been slow and indirect. Some 75 years after Sloane wrote his book on ocular therapy, ophthalmology was established as an independent specialty in Vienna by Georg Beer, MD (1763-1821). In his classic textbook, Beer recommended ocular usage of many items Sloane advocated, but which have been supplanted today, including aloe, tutia (zinc oxide), and axungia viphera (viper fat).

JOURNAL EDITOR

The oldest scientific publication in the English language is the Philosophical Transactions of the Royal Society (Figure 5), which still thrives today. It first appeared in 1665 and just missed being the first scientific journal ever. A few months earlier a French publication, the Journal des Scavans, earned that honor. These publications originated as a means of responding to correspondence and transmitting scientific information. While philosophy may not seem to be related to science today, it was important in the early development of science, which evolved from quests to understand the natural world. Sir Isaac Newton’s fundamental work on astronomy, for example, was titled Philosophiae Naturalis Principia Mathematica (1687). In the early history of science, natural philosophers related causation to concepts that modern scientists would not even consider. Spiritual forces were felt to be a necessary part of the real world until well into the 19th century.

The new scientific journals were tangible records of observations and discoveries. Previously, questions of priority often led to bitter disputes. Copyright laws and ethical codes did not exist. Plagiarism frequently resulted in complaints of intellectual theft. With the introduction of scientific journals came a sense of mutual advance in the scientific community toward understanding nature. Earlier authors might publish records of their discoveries to establish priority, but hide the details in obscure wording or private jargon to prevent plagiarism. Prompt publication of manuscripts with emphasis on the scientific journal as an archive made these actions unnecessary. The prestige of the Royal Society gave validity to its journal. By the early years of the 18th century, manuscripts were evaluated carefully before publication. This was the origin of peer review in scientific journalism.

Sloane was responsible for publication of the journal for 18 years, beginning in 1695. He took over at a low point in the history of the Royal Society, when it was near extinction from lack of suitable contributions. He was the owner and editor of the journal, responsible for obtaining the items to be published. Profits were rare and losses were...
made up from his assets. Since Sloane was at the center of the scientific and scholarly world, his large circle of friends and international correspondents provided material for his journal, even during wartime. Although governments might fight, scientists kept their lines of communication open.25,26

His editorial style was laissez faire, meaning Sloane made few changes in the concepts or wording of the outside contributions he found worthy of publication.27,28 What began as an editorial policy of necessity, to obtain enough material to keep the journal alive, evolved into a system that gave responsibility for validity to the scientific community. Readers were encouraged to respond in print to published material. This editorial style has been copied frequently. The illustrious German pathologist Virchow put it another way: Anyone was free to make a fool of himself in his journal.

One of Sloane’s biographers has written, “It may be claimed that Sloane introduced the scientific method into medicine,” for Sloane showed that the unverified hypotheses of old-style medicine could not explain some newly discovered facts.5,29 Sloane emphasized that theories of the 4 humors (blood, phlegm, cholera, and melancholy), which went back to Galen’s time, were inconsistent with the proof that medications can cure disease. In the preface to one volume of his journal, Sloane revealed how experiments with quinine overthrew all the old hypotheses about malaria.30 Ancient theory was no longer adequate. Medicine was on a new path blazed by experimental science.

For the most part, science was conducted by amateurs during the 17th century.31 From its beginnings in the 1660s, the Royal Society emphasized fact, experiment, and careful observation. However, there was an undercurrent of public opinion that considered these men idlers and dabblers. In Gulliver’s Travels, Jonathan Swift (1667–1745) satirized the Royal Society as a group of dilettantes. Even the most famous Fellow of the Royal Society, Sir Isaac Newton, took care to state he was a serious scientist who relied on hard data, not hypotheses.32 The Royal Society was under attack from several directions. Some writers and businessmen disparaged their activities as trivial, or even worse, lunacy.33,34 The clergy considered their pursuit of the carnal world an inappropriate use of the mind and a dangerous subversion of religion. The Fellows of the Society tried to ignore their detractors.

SLOANE’S SCIENTIFIC PAPERS

In addition to publishing outside contributions to the Philosophical Transactions, Sloane published more than 30 of his own articles in the fields of medicine, natural history, and botany. He was involved with the 2 most important medical advances of his time, which have recently been included in a list of the 10 greatest advances in the history of medicine—microscopy and the prevention of smallpox.35 One of Sloane’s correspondents was Antonie von Leeuwenhoek (1632–1723), the Dutch microscopist who was the first to describe much of the histology of the eye. Sloane consulted him in conjunction with one of his own papers.36

Sloane’s account of inoculation against smallpox preceded Edward Jenner’s book on vaccination by 42 years.37 In a curious twist of fate, Jenner’s book was rejected for publication by the Royal Society and was published privately. Inoculation is acquisition of smallpox through intradermal exposure of infectious material taken from individuals with active disease. It usually results in far milder illness than naturally acquired smallpox. Inoculation had drawbacks. Sometimes other diseases, even syphilis, were transmitted in addition to smallpox. It could cause severe inflammation at the treatment site, and carried a fatality rate of 1% to 2%. This was far better than the disease itself, which was nearly universal throughout Europe and had a fatality rate of 10% to 30%.38 The virulent form of smallpox, variola major, was a common and feared disease during the 17th and 18th centuries.39 It caused 35% of cases of blindness, usually through blepharoconjunctivitis and corneal ulceration.40 Sloane’s article describes consideration of inoculation by the royal family. This was important, for if they were to adopt the procedure, the aristocracy and then the rest of the population would be likely to follow. After one of the English princesses nearly died of smallpox, her mother (the Princess of Wales) asked Sloane his opinion of inoculating her other children. Undoubtedly, he could not forget the difficulty he had encountered in caring for her when she had been on death’s doorstep several decades earlier. Nor could he forget that he had smallpox as a child. He hedged his response, stating that inoculation seemed to prevent the great danger of smallpox, but not being certain of the consequences, “I would not persuade nor advise the making trials upon patients of such importance to the public.” She then asked if he would dissuade her from it. He replied “I would not, in a matter so likely to be of such advantage.” Trials of inoculation were carried out on condemned criminals and on some charity cases, with good results. The public and the newspapers followed the trials closely. In modern terms, this was the first planned immunological experiment. After Sloane discussed inoculation with the King, the royal children were treated. The procedure “succeeded as usual, without any danger during the operation, or the least ill symptom or disorder.” Others inoculated at about the same time and died. Many years of acrimonious debate were to pass before Jenner’s method of vaccination with cowpox virus became the standard immunization.

“An account of symptoms arising from eating the seeds of Henbane” is Sloane’s report of 4 children who suffered from muscarine poisoning.36 Sloane recognized the seed as Hyoscyamus niger, also known as common henbane. The children’s symptoms included “great Thirst, Swimmings of the Head, Dimness of Sight, Ravings, and profound Sleep.” His diagnosis seems entirely reasonable today, even if the therapy has changed. His treatment was bleeding, blistering, and purging. Fortunately, all the children recovered “perfectly.”
Sloane was particularly interested in the therapeutic value of botanical preparations. Dog's mercury, a weedy European perennial plant, and ipecac were the subjects of other articles.

To stimulate readers of his journal, he published on unusual topics, such as bezoars, rhinoceros horn, severe dropsy, and stone swallowing to improve digestion.

In "Conjectures on the Charm- ing or Fascinating Power attributed to the Rattle-Snake," Sloane tested the concept of the evil eye. He designed an experiment to examine the common Notion, that several chronicl wasting Diseases, and such Disorders of the Nerves as are not easily accounted for, not only in Men, but in Cattle, are believed to be the Effects of an evil Eye of old malicious Women, &c. thought to be Witches and Sorcerers, or assisted by the Devil.

Part of the evil eye theory was that the intense gaze of the rattle- snake can force small animals to fall into their mouths. He obtained a rattlesnake from Virginia, and had it bite a dog. It died in less than 3 minutes. This experiment proved to Sloane that the evil eye had nothing to do with the enchanting mystery of the rattlesnake's gaze. It was purely poison.

THE BRITISH MUSEUM, NATURAL HISTORY MUSEUM, AND BRITISH LIBRARY

Sloane is best known today for his collections, which formed the core of the British Museum at its founding in the mid 18th century. His collecting interests were broad and fit with the 17th century concept of a collection as a means of advancing scientific knowledge. Sloane had a clear idea of what he was doing: “... the collection and accurate arrangement of these curiosities constituted my major contribution to the advancement of science.”

He had his priorities straight. Collecting did not interfere with his medical practice:

I never, unless very extraordinary business carries me out of town, neglect any matter that is relating to sick persons, whatever I may do as to curiosities.

Sloane's collections began with the botanical items that he collected on his trips to France and the Caribbean. Artificial eyes, plants, minerals, jewels, shells, coral, insects, animals, coins, antiquities, and prints were just some of the things he collected. There were unusual items, such as a record-sized pair of buffalo horns, 14 feet across, and rhinoceros heads. There were specimens of human anatomy and pathology, which were donated later to the Royal College of Surgeons. The extent of the material was overwhelming. The catalogue of just the plants required 337 large folio volumes. Even excluding the botanical items, there were nearly 80,000 pieces in the collection. His library of more than 40,000 books and 4000 manuscripts included many rarities, with particular strength in his main interests, medicine and natural history.

The library of the British Museum, which contained Sloane's books and manuscripts, was an integral part of the museum from its inception. In 1973, it and several other national collections became a separate institution, the British Library. Millions of visitors have been eternally grateful to Sloane for all his contributions to civilization.

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