

Medical Atlanticism

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ABSTRACT The term ‘Atlanticism’ is used to define the cooperation between Western European and North American nations, usually in matters of politics or defence. The purpose of this paper is to show that from the time of the Spanish conquistadors, there has been an effective communication in medical matters across the Atlantic that can best be defined as ‘Medical Atlanticism’. As colonies developed in North America, there were increasing contacts with European nations. During the eighteenth century, the University of Edinburgh played a major role but later, in the nineteenth century, France, then Germany and Vienna, shaped the development of medicine in the United States. Britain was to be greatly influenced by the example of first Germany, then the United States. Today, ‘Medical Atlanticism’ is an outmoded term since medicine has become global.

KEYWORDS Atlanticism, medical science and education in Britain, France, Germany and the United States, transatlantic contacts

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INTRODUCTION

The term ‘Atlanticism’ refers to:

‘A doctrine of cooperation among Western European and North American Nations regarding political, economic or defence issues ...’¹

A Secretary General of NATO, in an Eisenhower lecture, has pointed out that, for him, the concept of Atlanticism was defined in the North Atlantic Treaty signed by President Truman and his Secretary of State, Dean Acheson, in Washington, in 1949.²

FIRST STEPS

Yet for the historian, Atlanticism has a far more ancient lineage. During the heydays of Spain and Portugal, along with their colonies in the Americas, they could claim an Atlanticism of the South Atlantic. Linked economically and politically for two centuries after Columbus, the wealth of the Americas sustained Iberian empires that were unchallenged until the later years of the reign of Queen Elizabeth. At the same time, French mariners and explorers were beginning to penetrate the North American continent, with Jaques Cartier sailing up the Saint Lawrence River in 1534. La Salle and others travelled from the Great Lakes, down the Mississippi to the Gulf of Mexico a century later, claiming the land for the King of France. Others were to reach the north-west coast of America.

It was during this early period of American history that the new links between America and Europe first began to influence medicine. European medicine was taken to the

new colonies by conquerors and missionaries. Cortes founded the first hospital in the Americas in 1521 in what is now Mexico City.³ It was the Hospital de la Concepcion de Nostra Senora and was funded entirely by Cortes himself. He made provision in his will for its continued support. At the same time, there were new medical discoveries to be made in the Spanish colonial territories. Jesuit priests learned from the native Indians in Peru that the bark of a tree could relieve fever. Jesuit’s bark, from the tree later named ‘Cinchona’ by Linnaeus, was said to have been used in the treatment of an attack of fever suffered by the Marquesa of Chinchon, wife of a famous Viceroy of Peru. The bark was brought to Europe by the Jesuits in the early years of the seventeenth century and sold through their pharmaceutical connections.⁴ It was to be widely prescribed for fever by the physicians of eighteenth century London.

The French founded the first hospital north of Mexico. The Hotel-Dieu in Quebec City was established in 1639, through the good offices of Marie-Madeline de Vignerot, a niece of the powerful Cardinal Richelieu.⁵ She helped with the financing of the new hospital, and brought nuns from Dieppe to care for the sick, as these nuns continue to do today. The hospital is still active, and a small museum records its history.

In the meantime, the British North American colonies were making a slower start. Jamestown in Virginia was first settled in 1607, and Massachusetts, by the Pilgrim Fathers, in 1620. But it was not until nearly a century-and-a-half later that the first hospital appeared, in Philadelphia, in 1752. Since those early days, however, there has been a constant interchange of medical men and ideas between North America and Europe, a two-way medical traffic that

has been to the great benefit of both. In this paper, I shall seek to outline how this happened. I shall seek too to show how the 'doctrine of cooperation between Western European and North American Nations' in medical matters may perhaps be defined as 'Medical Atlanticism.'

There were medical men among the earliest settlers of the American Colonies. At Jamestown, William Wilkinson and Thomas Wotton were surgeons.⁶ On the *Mayflower*, there were two physicians. Miles Standish, the commander of the *Mayflower*, had picked up medicine in his daily life by watching other physicians. Another was Dr Samuel Fuller, who died during the first smallpox epidemic to hit the colonies in 1633.⁷ In those early days, the medical needs of the settlers were served by immigrant physicians, by apothecaries who set up shop and also practiced medicine, and by ships' surgeons who decided to throw in their lot in the new colonies rather than return to their native land. And there were the 'quacks' and 'mountebanks' who hoodwinked a gullible public to their advantage. As in the Spanish colonies, there were men of the cloth who undertook the role of physicians in those early years. In Boston, the Rev Cotton Mather, who read about smallpox inoculation in the *Philosophical Transactions of the Royal Society*, persuaded his physician Dr Daniel Boylston, to carry out the procedure in the early years of the eighteenth century.⁸ He also learned about the value of inoculation from his slave, Onisemus, who told him how the practice had crossed the Atlantic with the slaves from Africa. There was also a successful trade in pharmaceuticals between German pietists connected with Halle and the North American colonies. The Lutheran patriarch, the Rev Heinrich Melchior Muhlenberg, who cared for the bodies as well as the souls of the rural Pennsylvania German immigrants, explained how, since doctors were few and far between, 'I necessarily had to take a hand myself'.⁹

By the middle of the eighteenth century, however, there were the beginnings of an organised profession. As Benjamin Franklin put it, when he founded the American Philosophical Society in Philadelphia in 1743:

'The first drudgery of founding new colonies is now pretty well over and there are many in every province in circumstances that set them at ease, and afford leisure to cultivate the finer arts, and improve the common stock of knowledge.'¹⁰

AMERICANS IN EDINBURGH

There were soon enough young American students seeking careers in medicine who had the necessary means and the aspirations to go abroad, often after an apprenticeship to a physician at home. They sought to finish their professional training at one of the Continental centres – Paris or Leiden in the earlier years, and later at London, or the newly founded medical school at Edinburgh, which, after the death of Herman Boerhaave in

Leiden in 1738, became the educational 'Mecca' for aspiring American physicians during the eighteenth century. Between 1749 and 1800, 117 Americans received medical degrees from the University of Edinburgh.¹¹

In 1738, Dr Thomas Bond, a Quaker physician from Maryland, was in London seeking further education. He visited on this occasion a young fellow Quaker, Dr John Fothergill, who encouraged him. Fothergill wrote to his Philadelphia correspondent, Israel Pemberton, that Bond was 'an intelligent person and has made considerable advances in the knowledge of his business.'¹⁰ Thomas Bond was to be his first American medical friend. Fothergill at this time was 26 years old. His family had close relationships with the American Colonies, his father, a ministering Friend, having made three visits to American Quaker Meetings during those early decades of the eighteenth century.¹³ His brother Samuel was to emulate his father during a visit to the American Colonies in the 1750s. So it was not surprising that the young Fothergill was selected by London Yearly Meeting as their correspondent with the Philadelphia Quakers.

Fothergill was to be closely involved with American affairs throughout his life. He became in due course one of London's most successful physicians, attending Clive of India, John Wesley, Fletcher Norton, the Speaker of the House of Commons, Lord Dartmouth, later Secretary of State for the American Colonies, the Penn family, the proprietors of Pennsylvania, as well as Benjamin Franklin, that eighteenth-century Atlanticist, an 'Old England man', as Esmond Wright has put it.¹⁴ Franklin, also his patient, became his close friend. Furthermore, when his Philadelphia friend Thomas Bond, with the active support of Benjamin Franklin, founded the Pennsylvania Hospital in 1752,¹⁵ Fothergill was to be one of the hospital's trustees.

During those years, the Edinburgh medical school was the major attraction for the American students who crossed the Atlantic for further education. When Arthur Lee came to London from Virginia in 1760, he met Dr Johnson who told him that:

'If you have a large Fortune, & time enough to spare, go to either of these (he was referring to Oxford or Cambridge). But if you would choose immediately to enter upon Physic, and to attain sufficient knowledge therein, to carry you through Life, & at small expense, & in a short time, by all means (go) to Edinburgh or Leyden; for the Scotch or foreign education is like a House built to last a man's lifetime only; The English is like a Palace, or fortress intended to last for many ages. The first build slightly, the last lay a very strong and firm Foundation before they begin the Work.'^{14, 16}

Johnson, however, underestimated the importance of a Scottish education. Lee, like other Americans, was

encouraged by John Fothergill to choose Edinburgh. Fothergill, a graduate of Edinburgh in 1736, was the first Edinburgh alumnus to become, in 1744, a Licentiate of the Royal College of Physicians in London.¹⁷ As Lee wrote, Fothergill's reputation as an Edinburgh graduate who was a successful physician in London had cast such a lustre on the status of Edinburgh:

'that it is now universally resorted to and I believe contains more Physical students than half the Colledges in Europe together with the American Students of whom there is a great number.'¹⁸

Fothergill, unlike Dr Johnson, had no opinion of Universities such as Oxford. 'There I should find,' he wrote, 'men of the first rate of understanding engaged in an idle round of that which the lowest of mankind can enjoy as much as themselves – eating drinking and sleeping'.¹⁹ It was the Oxford of Edward Gibbon, when the University was plunged in port and prejudice.

Although Edinburgh was to have a great influence on American students, the Americans too were to influence Edinburgh. They were known to be hard-working and they had an interest in ensuring that the degree that they took would be of the highest standing. So that when in 1764, two individuals who had not fulfilled the University's requirements were awarded degrees, Arthur Lee persuaded twenty-nine of his fellow students, mostly American, to sign a memorial to their professors protesting the faculty's actions.²⁰ They were sympathetically received by their professor, William Cullen, whose warmth and friendship with his pupils was much appreciated by his American students. It was an important move that helped preserve the reputation of Edinburgh at a time when Universities such as St Andrews were continuing to peddle degrees. Lee became during his Edinburgh years a close friend of a fellow student, John Haygarth, later to be involved in smallpox prevention when he was a physician in Chester.²¹ They were to make a continental tour together in 1765, visiting Leyden and Paris, a journey that Haygarth never forgot. Lee later abandoned medicine for the law and was with Franklin in Paris during the American Revolution.

John Fothergill was throughout his career a supporter of Americans. When Benjamin Franklin's communications to the Royal Society on electricity were published in 1751, Fothergill wrote an unsigned preface and saw the manuscript through the press.²² A year later, he founded a small but select society of physicians, which published its proceedings – *Medical Observations and Inquiries* – in several volumes between 1757 and 1784. Fothergill's encouragement of his American colleagues is illustrated by the four papers by prominent American physicians that he included in his first volume²³ – his friend Thomas Bond of Philadelphia on a guinea worm; Cadwalader Evans on a cure performed by electricity, in the presence of Benjamin

Franklin; Lionel Chalmers of Charleston, South Carolina on Tetanus; and Cadwalader Colden of New York on the *Throat Distemper*, upon which Fothergill himself had written the classic work in 1748.²⁴

NORTH AMERICAN MEDICAL SCHOOLS

It is therefore not surprising that American medical visitors had a standing invitation to breakfast with Fothergill during their time in London. The first proposals for a medical school in America were discussed at his breakfast table. When the young William Shippen returned to Philadelphia in 1762, after anatomical studies with the Hunters in London, and an MD from the University of Edinburgh, he took with him a gift from Fothergill to the Pennsylvania Hospital – anatomical casts, a human skeleton, a human fetus preserved by injection, and eighteen crayon drawings in colour showing various parts of the human body.²⁵ They were the work of Jan van Rymdsdyk, the talented Dutch artist who provided William Hunter with the illustrations of his work on the *Human Gravid Uterus*. Fothergill told his correspondent James Pemberton that he had 'recommended ... to Dr Shippen to give a course of anatomical lectures to such as may attend ...'²⁶ It was a development that caused a certain jealousy elsewhere. Samuel Bard, a young New Yorker who enjoyed Fothergill's patronage in London, was studying in Edinburgh at that time. He wrote to his father telling him:

'it is not to stop with anatomy but to found, under the patronage of Dr Fothergill, a medical school in that place ... I own'.

He went on: 'I feel a little jealous of the Philadelphians'.²⁷

John Morgan played the major role, along with William Shippen, in the foundation of America's first medical school.²⁸ He too was much influenced by conversations with Fothergill in London. Morgan, born in Philadelphia in 1735, graduated in Edinburgh in 1764. A year later, he returned from a glittering continental tour that included the winter in Paris, a visit to Morgagni in Padua and a welcome by the sage of the Chateau Ferney. Voltaire warned him against priests and all their doings, expressed admiration for everything English and questioned whether his little dog might not have a soul.

Morgan had by now been elected to the Royal Society in London, was a member of the Academie Royale de Chirurgie de Paris, licentiate of the Royal College of Physicians of London and a member of the Edinburgh college too. He had also had his portrait painted by the remarkable Angelika Kaufmann. Thomas Penn, then the Proprietor of Pennsylvania, undoubtedly influenced by his physician John Fothergill, had recommended to the Philadelphians the establishment of professorships for 'the study and practice of Physick and Surgery'. Morgan

was duly appointed Professor of the Theory and Practice of Physick. In May 1765, he delivered his *Discourse Upon the Institution of Medical Schools in America*, which was to have a major influence on the development of medical education in the Colonies. William Shippen was soon appointed Professor of Anatomy. Benjamin Rush followed as Professor of Chemistry in 1768, returning with a degree from the University of Edinburgh and a testimonial from Fothergill recommending him for the Chair.²⁹

New York followed Philadelphia's example. In 1767, another of Fothergill's proteges, Samuel Bard, had returned home with an MD from Edinburgh. He now joined with Peter Middleton, who held an MD from the University of St Andrews, and John Jones, a surgeon who had been a favoured pupil of John Hunter, to set up the New York School that later became part of Columbia University.³⁰ When the New York Hospital was founded, Fothergill was a trustee.

Harvard's medical school was not established until 1782, a year after Cornwallis' ignominious defeat at Yorktown.³¹ The key figure was John Warren, whose physician brother Joseph was the first popular hero of the American Revolution. He was mortally wounded by a shot through the head in the carnage at Bunker Hill. John Warren became professor of surgery. Here again, however, we can detect the hand of Fothergill. The Rhode Island Quaker, Benjamin Waterhouse, was appointed to the first Chair of Medicine in 1782. He was Fothergill's cousin and had stayed with him during the years when he attended the Edinburgh medical school. It was at Fothergill's summer home at Lea Hall near Chester that Waterhouse met Arthur Lee's friend, John Haygarth, physician to the Chester Infirmary. They shared for many years an interest in the control of infectious disease, particularly smallpox. In later years, Waterhouse was to obtain the honorary degree of MD at Harvard for Haygarth.³²

AMERICAN INDEPENDENCE

The American Revolution, however, caused considerable disruption to the efforts of young Americans to develop their own medical schools. In London, John Fothergill, with his friend Benjamin Franklin, both committed Atlanticists, tried desperately to prevent the coming conflict. 'Do, my Noble Much Esteemed Friend,' wrote Fothergill to his patient, the Earl of Dartmouth, Secretary of State to the American Colonies, and half brother of the Prime Minister, Lord North:

'forget the little trifling quarrels fomented by mischievous people for the ruin of this great Empire, and give America all she asks. Was my life worth pledging, I think I could do it safely, that she will amply repay the condescension. Violent measures will ruin us both ...'³³

But the die were already cast. Benjamin Rush, who had been converted to Republican principles when a student in Edinburgh,³⁴ was one of those courageous men who signed the Declaration of Independence in Philadelphia in 1776. He had befriended Thomas Paine when he arrived in the city only the year before. Tom Paine had written the pamphlet *Common Sense*, the first to call for out and out independence; it became the literary touchstone of the American Revolution.³⁵ In it he had called upon Americans to cast aside Britain and its 'Royal Brute', George III. They should 'claim brotherhood with every European Christian'. Rush met Paine by chance in Mr Aitkin's bookstore in Philadelphia; it was he who suggested the name for Paine's virulent anti-British invective.

It is not surprising that American medicine was so much influenced by Britain during the colonial period. In the years immediately after independence, that influence continued. When William Withering published his work on the foxglove,³⁶ it was not long before American physicians such as Hall Jackson obtained seeds and began to propagate this important diuretic.³⁷ In 1798, Jenner published his epoch-making work on vaccination.³⁸ Within a year, Waterhouse in Boston received vaccine lymph from his old friend John Haygarth, now retired from Chester to Bath, where he lived in some splendour in No. 15, The Royal Crescent. Waterhouse, through his work on vaccination, became known as the 'Jenner of America'. Oliver Wendell Holmes could recall, it is said, being vaccinated as a child sitting upon the knee of the aged Waterhouse.

Yet it was not long before American physicians sought to establish their independence. When, in 1806, John Haygarth wrote to the College of Physicians of Philadelphia suggesting how they might investigate the mode of transmission of Yellow Fever, a cantankerous young Philadelphian, Dr Charles Caldwell, attacked him for his supposed errors and sought to vindicate the right:

'that the Faculty of the United States have to think and decide for themselves respecting the diseases of their country uninfluenced by the Notions of the Physicians of Europe'.³⁹

During the early years of the nineteenth century, however, the Edinburgh school began to lose its sparkle – and the Burke and Hare episode did not help.⁴⁰ Whereas in the pre-Revolutionary era, John Morgan had found that medicine was not much in vogue in Paris, and that the practice in the Paris hospitals was in no way comparable to that in Edinburgh, his compatriot Ferdinand Campbell Stewart, visiting the French capital in 1843, thought Paris to be the best teaching centre in the world.⁴¹ By now American physicians had paid heed to Tom Paine's admonition that they should 'claim brotherhood with every European Christian'. During the ante-bellum years

they turned first to France; then, during that period of entrepreneurial expansion that characterised the new Republic after the Civil War, it was Germany and Vienna that were to do so much to mould the character of American medicine.

AMERICANS IN PARIS

For young American physicians, a visit to Paris was an exhilarating experience. Oliver Wendell Holmes, writing to his parents as a young student in 1833, told them:

'merely to have breathed a concentrated scientific atmosphere like that of Paris must have an effect on anyone who has lived where stupidity is tolerated, where mediocrity is applauded and where excellence is defied'.⁴²

Yet for those many who undertook a transatlantic journey, at considerable personal expense, it was not, as Ackernecht⁴³ and Richard Shryock⁴⁴ have argued, just science that the visitors sought. In the America of those days, many of the newer medical schools, founded as the Union spread westwards, gave very little practical experience. Their hospitals were often small and insignificant. Furthermore, it was very difficult to obtain experience of dissection of the human body. In Paris, however, the hospitals with their large number of patients offered ample opportunity for clinical studies. Access to the dead from the hospitals permitted dissection on an unimaginable scale. The lectures and clinics of the great teachers were open to all and sundry. It was free, the student simply requiring a ticket from the Ecole de Medicine. In addition, medicine in Paris was organised in a way that appealed to young and idealistic Americans, coming as they did from the meritocratic world of the first of the world's great republics. In post-revolutionary France, the hospitals belonged to the State and the Professors were paid by the state. The junior staff – the 'internes' – were appointed through the *concours* – an open competition in which all, even the poorest and most disadvantaged, might join. The contrast with the situation in London, where nepotism and payment for positions was normal and where attendance at the clinics of the great was expensive, was not lost upon young Americans. As one young student put it, London was dominated by gain, and Paris, by science.⁴⁵

The actual numbers of Americans who went to Paris is not known for certain. Russell M Jones estimated that there were 105 in the 1820s, 222 in the 1830s, 128 in the 1840s, and 279 in the 1850s.⁴⁶ Relatively few formally registered in order to graduate. Of those who did, many were Francophone students from Creole families in Louisiana. It must not, however, be thought that all American students were young apprentices or the recently graduated. There were also those who were already established in practice and who, undertaking what

might be thought of as a sabbatical, sought that further enlightenment that Paris could give them.

Typically, the student would attend the lectures and clinics in the morning, perhaps dissect during the afternoon, and then in the evening join a small group with one of the internes of the hospitals for practical instruction on hospital patients. This facility, which had to be paid for, was a major attraction giving experience that would not have been possible at home. It was highly regarded. There were also opportunities for making intimate examinations of women. These so-called 'touchers' paid two francs for the privilege. That would not have been possible in pre-war America, before the Civil War, nor for that matter in London or Edinburgh at that time.

The clinical instruction of those days was given by some of the leading clinicians of their time. Americans learnt how to use a stethoscope from Laennec, and there were lectures by Broussais and Bichat. In later years, they attended the physiological laboratories of Claude Bernard. Surgeons included Dupuytron and Velpeau, who, as John Young Bisset told his wife in an 1836 letter, was the son of a poor but respected blacksmith. He was:

'a poor boy without money, time, education, or friends, who has by industry made himself one of the first surgeons in Europe'.⁴⁷

It was a 'rags to riches' story that appealed to the egalitarian ideals of the young Americans. But there were also the aristocrats. At l'Hopital St Louis, the Royal physician Baron Alibert⁴⁸ taught skin diseases, having reluctantly accepted the system of the London physician Robert Willan.⁴⁹

Yet the individual who influenced Americans and American medicine more than any other was Pierre Louis of La Pitie. It was he who introduced the numerical method in medicine. Osler, in the book of essays entitled *An Alabama Student*, includes a fulsome appreciation of Louis in his article 'The Influence of Louis on American Medicine'.⁵⁰ Louis was born in 1787. He studied medicine first at Rheims, then went on to graduate in Paris in 1813 at the age of 27. He spent some years in Russia, and came back to Paris in 1821 at the age of 34. For the next six years, he did no personal practice but, encouraged by Chomel at La Charite, studied rigorously, in meticulous detail both in the clinic and at autopsy, all the patients that he encountered. It was this work that led to his much acclaimed publications on phthisis and the intestinal lesions of typhoid. He also attacked the practice of blood-letting, observing that in two series of patients with pneumonia, bleeding was of no value. His work was to be repeated at the Massachusetts General Hospital between 1824 and 1834 by his pupil James Jackson.⁵¹ Louis introduced rigorous numerical analysis to medicine. His motto was '*Ars Medica tota in observationibus*' (The art

of medicine is entirely observation). It was his work, and that of his colleagues in Paris, that destroyed the dependence on the theoretical systems of Cullen, John Brown and Benjamin Rush upon which the Americans had until then been reared. It was through the translations of his books that he became best known in America, as well as through his students who included HI Bowditch, Professor of Medicine at Harvard, his Boston colleague Oliver Wendell Holmes and Alfred Stille of Philadelphia. Louis had founded the Societe Medicale d'observation, which many Americans attended during their stay in Paris. The idea was copied by the Bostonians who established their own Boston Society for Medical Observation. Louis, though speaking no English, was a warm and friendly man who, like William Cullen in Edinburgh, invited American students to his home. There were, according to Osler, 27 of his pupils who became significant figures in American medicine. The affection that he inspired is illustrated by the letter written by a young American when he left Paris in July 1833.

'In two hours, I am out of Paris', he wrote to his father; 'I will not attempt to describe to you the agony it gives me to quit Louis; he is my second father...'⁴⁹

It must not, however, be thought that the transmission of medical knowledge was entirely one way. In 1846, American medicine made its first major contribution to the modern world. Ether was first successfully used in Boston on the 16th of October. Thanks to the introduction of steamships on the transatlantic route by Samuel Cunard, the news reached Liverpool, in a message sent by Jacob Bigelow in Boston to his friend, an American physician of the name of Boott, who lived in London, on December the 16th on the wooden paddle steamer, *Acadia*. Etherisation, as it was called, was successfully used by Robert Liston at University College, London, before Christmas. It was, incidentally, Oliver Wendell Holmes who coined the term 'anaesthesia'.⁵³

The steamship was important in bringing North America and the countries of Europe closer together. An American visitor could now reach England or France in ten or twelve days, in contrast to the six weeks or more that a sailing ship would need. Furthermore, there had been appalling passages in the days of sail. Adam Cunningham travelled from Scotland to Virginia on a ship whose Captain was drunk throughout the voyage. The ship ran out of food and water and they had to be sustained by begging from passing vessels. They finally ran ashore on a sandbank in the James River six months after departure.⁵⁴

VIENNA AND GERMANY

Meanwhile, there were important developments in Germany. In 1810, Willem von Humboldt, Minister of State in Prussia, founded the University of Berlin. The *soziale Leitbild* (social guideline) of the new university was

Einsamkeit und Freiheit, solitude and freedom, and this philosophy was to spread throughout Germany during the nineteenth century. Specifically, the new institutions were to encourage research.⁵⁵

As far as biomedical science is concerned, much was known by the middle of the nineteenth century. It had been shown that life is maintained by chemical reactions of the same nature as those that occur in test tubes. In 1847, Herman von Helmholtz showed that the laws of the conservation of energy applied as much to living things as to inanimate matter. The main ingredients of food – fat, carbohydrate and protein – were identified and their transformation in the body was studied. Physics was also important. The induction coil, developed between 1830 and 1850, made it possible to construct galvanometers, an indispensable tool for the physiologist. It was also during the nineteenth century, particularly in Germany, that the microscope came into its own. Capitalising on the improvements in microscopy that followed the production of the achromatic lens by a Quaker wine merchant in London, Joseph Jackson Lister, the father of Lord Lister, German histologists were able to show that all living organisms are made up of very small units or cells, not visible to the naked eye. In disease, they showed that there might be specific disorders of these cellular elements. By 1858, Rudolf Virchow, in his great work *Die Cellular Pathologie* was able to demonstrate a whole new concept of human disease based on disturbances of the cellular structures of the human body. Later, the work of Pasteur in France, and of Robert Koch in Germany, supported by many brilliant colleagues, established the science of bacteriology. From 1875 onwards, a whole range of diseases was found to be caused by microorganisms. These scientific developments led to profound changes in the structure of universities and their attitude to research, particularly in Germany.⁵⁶

It is therefore not surprising that as the nineteenth century wore on, American visitors returned home from Europe with glowing accounts of the new sciences in Vienna and Germany. Yet, as John Harley Warner has pointed out, there was a more prosaic reason why American students turned to Vienna and the German schools, particularly after the end of the War between the States.⁵⁷ In 1855, the Dean of the medical school in Paris banned the private teaching by *internes* in the city's hospitals. Perhaps he was concerned about the amount of prodding and pummeling that patients had to suffer at the hands of eager young Americans. At the same time, it became apparent that the *privatdozenten* in the Austrian and German hospitals, which offered a huge range of clinical material, were allowed to undertake such tutorials. In Vienna, the attraction to the medical student was not the teaching of Carl von Rokitansky, but the Allgemeine Krankenhaus, which had over a thousand beds. There were also outstanding research institutes. Perhaps the best known to young Americans was the Physiologisches

Institut in Leipzig, where Carl Ludwig trained a whole generation of medical scientists who instigated physiological teaching in the medical schools of Europe. More important for America, Henry Pickering Bowditch, nephew of the Professor of Medicine at Harvard, spent two years with Ludwig. He was to return to become Harvard's first physiologist in 1871. Others followed in his footsteps, particularly William H Welch and Franklin Paine Mall, who were two of the first professors appointed at the Johns Hopkins medical school.

THE NEW ERA IN THE UNITED STATES

By the later years of the nineteenth century, universities had begun to be involved in the teaching hospitals in America. As early as 1880, the University of Michigan had established that its clinical professors were on the university payroll and therefore not dependant on private practice or student fees. It remained, however, a scientific rather than a practical or clinical institution. The Johns Hopkins Medical School in Baltimore that was the first to be established on the German model.⁵⁸ It accepted its first students in 1893. The foundation professors were all to become men of distinction – William Welch in pathology, William Osler in medicine, WS Halsted in surgery, and Franklin Paine Mall in anatomy. All four had visited the clinics and research institutes in Germany and had spent time there. They had all been deeply influenced by that experience, and it was the German system that was followed in Baltimore. Internships and residencies were set up on the German pattern, and at once a whole new generation of medical students was attracted to the new school. Many were later to become leaders of the profession throughout the US. Osler, however, was never as Germanophilic as many of his later associates. Returning to London after his first visits to Berlin and Leipzig, he wrote [of England]:

'It is the world. How I would like to live here.'⁵⁹

It was another thirty-five years before he was able to do so.

At the beginning, however, there were no laboratories within the clinical departments, and therefore no opportunity for students to undertake laboratory research. Furthermore, the professors in clinical subjects were all involved in private practice. William Welch argued most potently for the creation of full-time clinical professorships within the medical schools. In his presidential address in 1901, to the Association of American Physicians, an influential body that had been founded in 1886, he pointed out that there should be research opportunities for clinical staff in the medical schools comparable to those already available in the basic sciences.⁶⁰ Whilst any young man wishing to make his career in basic science could find opportunities for the necessary training, Welch stressed that:

'with one or two exceptions, our hospitals do not offer the requisite opportunities to young men who aim for a higher career in clinical medicine and surgery... It would seem that the training of physicians and surgeons has not kept pace with the progress of medical science to the same degree as has that of the specialties in the more purely scientific branches.'

Undoubtedly these views had been influenced by Carl Ludwig, in whose laboratory in Leipzig, Welch had spent two formative years. Ludwig believed that it was necessary to build up clinical departments, which were devoted to research. But he thought that the change necessary to create such departments would be unlikely to emerge in Germany where he deplored the rigidity of the University system. He strongly advocated that America should pioneer these developments. As Max von Frey wrote to Franklin Mall at Johns Hopkins, 'You will remember that Ludwig often discussed this possibility'.⁶¹

Mall was an enthusiastic supporter of the idea that clinical departments should be firmly based in the university and have similar research aims as departments of basic science. He found in Lewellys Barker, one of his young assistants who taught neuroanatomy, a strong supporter of his views. Barker stressed that:

'a modern university must be a centre of original research, as well as a place of instruction. It should be made up of scholars who are not only familiar with the results of modern investigation, but who, skilled in the methodology of their respective sciences, invade new territories, searching diligently for new facts'.⁶²

Barker succeeded Osler as Professor of Medicine at Johns Hopkins in 1905, when Osler accepted the post of Regius Professor of Medicine at Oxford. There were, however, no funds then available to implement the full-time system. Nevertheless, Barker at once set up three clinical research laboratories on the German model within his department, the first in the US. They were headed by young men who were full-time scientists engaged in clinical investigation. One of them was Rufus Cole, who headed the biological or bacteriological laboratory. He subsequently became Head of the Clinical Centre at the Rockefeller Institute in New York, to which he recruited Oswald Avery, later to discover that the genetic material in bacteria is DNA. He wrote in later years that the opportunities for classical clinical observation had never been better than under Osler. Barker, however, had a more ambitious view. He believed that the primary function of a university department of medicine should be something more. It should, he thought, be involved in the encouragement of experimental rather than the purely observational research that had been so significant a part of the teaching of Pierre Louis. It was important that the

professor of medicine should be free from the routine burdens of private practice and allowed to devote himself to his own investigations and to those of his staff. It was to be some years before funds became available to achieve this ideal.

The most important developments in American medicine, however, followed the publication in 1910 of the report by Abraham Flexner on medical education in the US.⁶³ Flexner was the educationalist brother of Simon Flexner, first director of the Rockefeller Institute in New York. His report drew attention to the lamentable situation in many of the medical schools that had sprung up throughout the land after the end of the Civil War. Frequently, such schools had no effective academic support and relied for their teaching on the activities of local practitioners. In many of them, neither research nor laboratories existed. Flexner considered that there were only five institutions that could properly be regarded as centres for medical research – Harvard and Johns Hopkins, and the Universities of Pennsylvania, Chicago and Michigan. He was an outspoken supporter of the full-time system, and he based many of his recommendations on the German model then developing at Johns Hopkins. Emphasising the importance of internal medicine, he argued that academic internists should be able to:

‘devote their time and energy to painstaking study and experimentation, wide reading in many languages, discursive conversation and leisurely reflection... For the physician deals with that most complicated of mechanisms, the human body’.

Soon after this, the newly founded Rockefeller Foundation, now advised by William Welch, made funds available to Johns Hopkins for the establishment of full-time chairs in clinical subjects. With the stimulus provided by the Flexner Report, this pattern spread throughout the US. The majority of the old proprietary schools were closed down, and medicine became firmly based upon the university. By the 1920s, there were as many as twenty institutions that were beginning to overtake the best in Europe. The numbers of academic staff in medical schools increased steadily, particularly after the Second World War. Beeson and Maulitz have calculated that in 1947 there were perhaps six to twelve salaried staff members in most departments of medicine.⁶⁴ By 1974, in the University of Rochester, New York, to quote a typical example, the number of full-time staff had risen to over 100 and of these, 23 were of professorial rank.

The question has to be asked: how effective has the American organisation of clinical research been and what are its achievements? At the highest level, it is possible to examine the record of American clinical investigators in winning the Nobel Prize. It is remarkable that since 1934, when Minot and Murphy won the prize with George Whipple for introducing the liver treatment of pernicious

anaemia, 11 American investigators who were clinical academics have won the Nobel Prize.⁶⁵

THE AMERICAN INFLUENCE ON BRITAIN

Meanwhile, what was happening in Britain? During the heyday of Paris, young British students, like their American counterparts, were frequent visitors. In 1828, a House of Commons Committee noted that there were ‘200 students of anatomy’ in Paris.⁶⁶ According to William Baly, by 1835, when he was in Paris, there were as many as 300 English students every year. Later in the nineteenth century, however, most English students seemed to believe that home offered all that they needed. Whereas Thomas Hodgkin included a European tour in his formative years, learning the use of the stethoscope from Laennec, Thomas Addison did not, nor did Richard Bright. Sir James Paget made a brief tour of European centres as a young man but did not tarry long. Neither Joseph Lister nor the Cambridge physiologist Sir Michael Foster received any continental training, although Lister’s early work on microscopy was much influenced by German work.

Perhaps the views of late Victorian physicians in London on the work of other countries are best summarised by those of the St Bartholomews Hospital physician, Samuel Gee.⁶⁷ According to his friend Wickham Legg, Gee considered Boerhaave to have been the Batavian Hippocrates. He admired the French, particularly Laennec, and made a pilgrimage to his birthplace. He read all the new German and French work as it came out, but although he lived through that great era when German scientists created the new pathology, discovered X-rays and contributed so much to bacteriology, he was no great admirer of German work. He thought the Germans gave a great display of extensive reading but said of them what Montaigne said of their drinking; their aim was not to taste but to swallow – an extraordinary view of the German scientific revolution that did so much to transform medicine during the latter half of the nineteenth century. As to American medicine, following where Germany had led, Gee’s chauvinism persuaded him to an equally dismissive conclusion. According to Legg, ‘What came from America was but little prized’.

The American model, however, was to transform the clinics of the British medical schools.⁶⁸ By the first decade of the twentieth century, there had been a number of British individuals whose research in the clinic was internationally recognised. They included Sir James Mackenzie, his pupil Thomas Lewis, and Sir Archibald Garrod who had published his classic volume *Inborn Errors of Metabolism* in 1909.⁶⁹ Surgeons such as Victor Horsley were making major contributions to neurosurgery and to the understanding of thyroid disease, the use of thyroid extract having been pioneered by Murray in Newcastle in 1891.⁷⁰ In addition, Britain’s role as a colonial power,

particularly in Africa and the Orient, gave opportunities to men such as Patrick Manson, Ronald Ross and David Bruce in the newly developing disciplines of tropical disease. But as in the earlier years in the US, there were no academic departments in the clinical subjects, headed by fulltime professors, where young students could obtain the training necessary for clinical investigation.

Sir William Osler was to be an important figure in Britain at this time. Translated from Baltimore to the Regius Chair of Medicine at Oxford in 1905, he was dismayed at the medical educational desert that he encountered, and which he repeatedly criticised in lectures at medical schools throughout the land.⁷¹ The current arrangements were so different from those he had enjoyed at Johns Hopkins where the foundation professors had had the opportunity:

‘to blaze a perfectly new road, untrammelled by tradition, vested interests or medical dead wood’.

In 1906, following the twenty-year-old example of the Association of American Physicians, he founded the Association of Physicians of Great Britain and Ireland, a forum for those clinicians interested in medical education and research.

THE HALDANE REPORT

Before the First World War, the medical schools, of which the majority were based on the London Hospitals, were, in contrast to the situation in France or Germany, private institutions that for the most part had been founded before the University of London, with which they had little or no contact. There was very little encouragement of clinical research. The establishment of the Royal Commission on University Education in London, under the chairmanship of Lord Haldane, was to initiate the changes that led, so slowly and with characteristic hesitation, to the establishment of modern academic departments in clinical subjects, where there would be a proper emphasis on research in British medical schools. The Commission's report was published in 1913.⁷² Haldane sought to introduce university education into practical subjects such as medicine and engineering. The Commission was greatly influenced by the evidence of both the German and the newly developing American medical scene. Professor Ludwig van Muller came from Munich to outline the German system. Abraham Flexner, fresh from making his own report, came from the US to extol the virtues of German medical education as it had been developed in America and in particular at Johns Hopkins. Since there were no clinical departments in London with either laboratories or assistants, an American visitor, he told the Commission, would not wish to stay in London but would do best to hurry on to the continent where he would learn far more, particularly in Germany. Osler,

who gave his evidence in 1911, was particularly scathing in his condemnation of the situation in the London medical schools, which had no clinical laboratory base, no link with the university, and no paid staff. In Oxford, he bewailed the fact that although the University had had a Professor of medicine for centuries, there was no clinical medical school at all. He thumped the table and told Lord Haldane that the only solution was ‘an active invasion of the hospitals by the universities’.

It was the evidence of these individuals, together with that of the distinguished University College London physiologist, EH Starling, who was a member of the Commission, that led to the recommendation that academic clinical units, headed by full-time professors, should be developed in the London medical schools. Not unnaturally, there were immediate reactions from the senior and influential London consultants, who then controlled medical education there. Many opposed any change in the *status quo*. Their views were set out in the correspondence columns of the *British Medical Journal* by E Graham Little,⁷³ later to become a vigorously right wing MP for London University. He vehemently opposed the Commission's proposals. It was disgraceful, he implied, that there was no medical member of the Commission – only a physiologist. As to teaching and research in Germany, he wrote that British doctors were ‘sometimes shocked in Germany by what appears to the English-trained man as callous handling of the sick’, a viewpoint perhaps influenced by European events during those years immediately before the First World War.

The recommendations of the Haldane Commission were shelved during the war, which provided the reluctant medical schools with an excuse for inactivity. But in 1919, St Bartholomews Hospital appointed its first Professor of Medicine, Sir Archibald Garrod, the great pioneer of biochemical genetics who had brought biochemistry to the bedside. Garrod, however, never took up his post because he left London the next year to succeed Osler, who had died in Oxford on the last day of 1919.

By 1925, however, there were five chairs of medicine established among the twelve medical schools in London. Several of the London appointees had been greatly influenced by their experiences in the US. Sir Arthur Ellis, a Canadian who became the first Professor of Medicine at the London Hospital Medical College was a contemporary at the Rockefeller Institute in New York in 1910 of Francis Fraser, who was to succeed to Garrod's chair at St Bartholomews. Both men were therefore in the US during the period when full-time chairs were being established and when the Flexner Report was the subject of widespread academic debate. Ellis later wrote of that period of his life:

‘I have often thought what a remarkable act of faith it was, that we should have been consciously

attempting to fit ourselves for fulltime posts in medicine, when no such posts existed anywhere.⁷⁴

They were in fact forerunners of a new phenomenon – young British doctors seeking their postgraduate training in America. The number of such individuals was to swell after the Second World War, so that it became almost an essential for an aspiring academic that he had been to America.

The Second World War was a high point for Atlanticism, its ideals set out by Roosevelt and Churchill in the Atlantic Charter of 1941. It was also during those years that Florey and Norman Heatley took penicillin, newly isolated by Ernst Chain in Oxford, to America where pharmaceutical companies were able to manufacture their product on a large scale.⁷⁵

To return to the world of academe, the British professors had very much less power and influence than their American colleagues. In America, the professor was not only head of a department which included all the sub-specialties of medicine, but he was also chief of service of the clinical departments of the teaching hospital, which came increasingly under academic control. By contrast, the British professor simply controlled one unit among his part-time clinical colleagues, who continued to devote most of their time to private practice. It is therefore not surprising that the battle between full-time academics and part-time consultants over who controlled medical research and education was to rumble on for a full half century. Francis Fraser could recall in later years how difficult it was to recruit young men to full-time academic medicine when they could see Lord Horder arriving in some splendour in his Rolls Royce. Nevertheless, by 1944, when a further report on medical education was published – the *Goodenough Report*⁷⁶ – the move towards academically controlled medical schools, attached to hospitals with a strong university affiliation, had made reasonable headway and it now received enthusiastic support. Since those days, medical schools have developed clinical departments in a wide range of subjects and the opportunities for young men to undertake research in the clinic have been greatly extended.

There was one further development in which Osler played an important role. At the end of the First World War he pointed out that Britain was now in a strong position to take over the status of Vienna and the German schools in postgraduate medical education in Europe. With his fellow Canadian, HC Meakins, and the future Lord Dawson, he argued that doctors returning from war service urgently required educational opportunities.⁷⁷ There was also an imperial requirement in those dying days of the Empire, as there was a flood of medical graduates from the Dominions and colonies coming to Britain to seek specialist education. It was this concern that led to the recommendation by the Athlone Committee, set up in

1921, which proposed that there should be a specific school in London attached to a hospital dedicated to postgraduate medical education. It took some time. The school, the British Postgraduate Medical School, was not in fact opened until 1935. It was deliberately sited at Hammersmith Hospital, a London County Council institution, which was a far cry from the gilded halls of privilege, which were the London teaching hospitals.⁷⁸

From the start, the hospital and medical school were planned to develop according to the Flexnerian pattern, which had proved so successful in the US.⁷⁹ The hospital consultant staff were provided from University funds, the hospital by the London County Council. The architect of this Flexnerian model, unique in Britain, was Francis Fraser, later Sir Francis, who came from St Bartholomews to head the new Department of Medicine. His successor, John McMichael, introduced cardiac catheterisation to Britain – the technique had been pioneered in New York by Dickinson Richards and Andre Cournand who received the Nobel prize in recognition of their work. There were those who have considered that McMichael should have shared that prize. The school went from strength to strength with Sir John McMichael, as he now was, at the helm. By the 1960s, it had become, in the words of Noel Poynter:

‘The most advanced and successful in the British Commonwealth. It was an example of what can be achieved when the restrictions imposed by tradition and vested interests are loosened.’⁸⁰

In some ways, the opportunity presented to the founders of Hammersmith was similar to that enjoyed by the first professors at Johns Hopkins Hospital. British clinical research workers, however, have never been as successful as their American counterparts. None has earned a Nobel prize – though there are those who believe that Doll and Bradford Hill should have done. And it remains a matter of great rejoicing when a clinical academic is even elected a Fellow of the Royal Society.

ATLANTICISTS

This paper seeks to show how much modern medicine owes to the relationship between Europe and North America. There were many individuals – Fothergill, Pierre Louis, Ludwig, Osler and others – who were in fact ‘Atlanticists’. Just as one talks of the ‘Dark Ages’ or the ‘Augustan Age’, so it can be argued that we should use the term “Medical Atlanticism” to define that era which over three centuries and more has produced so much of the scientific medicine that has so enriched our lives. It is an era that has now gone – today medicine is global.

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