The Scottish Society Of the History of Medicine

(Founded April, 1948)

REPORT OF PROCEEDINGS

SESSION 2002-2003 and 2003-2004

The Scottish Society of the History of Medicine

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THE FIFTY FOURTH ANNUAL GENERAL MEETING

The Fifty Fourth Annual General of the Society was held in the Bio-molecular Sciences Building at St Andrews University on the 2nd November 2002. The President, Dr David Wright was in the Chair. The minutes of the Fifty Third AGM were approved. The Secretary's report was accepted. The Treasurer's report was presented by Dr Jonathan Wedgwood. Dr Wedgwood, who, following the sad death of Dr John Simpson had been looking after the Society's finances, was confirmed as the new Treasurer. Dr James Gray, retiring Council member, was thanked for his contribution. Dr Jimmy Macgregor was elected a new Council member.

THE ONE HUNDRED AND SIXTY FOURTH ORDINARY MEETING

This meeting followed the Fifty Fourth Annual General Meeting in the Bio-molecular Sciences Building at St Andrews University. The President introduced two speakers, Dr Geoffrey Millar talked on the early days of Ophthalmology in Edinburgh and Mr John Blair talked on the subject "Like it or Loath it, we all served".

THE EARLY DAYS OF OPHTHALMOLOGY IN EDINBURGH

In the first half of the eighteenth century the care of disorders of the eye bore little relation to what we practise today. The scientific content of the subject was minimal, it was held that cataract and glaucoma were the same condition, and not generally accepted that cataract arose in the crystalline lens. There was no knowledge of the pathology of ocular conditions and the internal structures of the eyeball were not understood. Ulcers of the cornea and trauma and its sequelae were recognised and a diagnosis of *ophthalmia* covered all inflammatory conditions. Treatment was restricted to the use of belladonna, silver nitrate, copper sulphate, mercury, poultices, purgatives, and bloodletting by scarification or the application of leeches. The operation for cataract, whatever the cause, was couching, also known as needling, being the insertion of a needle into the anterior chamber to displace the opacified tissue from the visual axis. The eighteenth century provided a happy hunting ground for mountebanks and charlatans and ophthalmic quackery enjoyed a heyday.

A milestone was reached when in the course of a couching operation in Paris in 1750 Jacques Daviel (1696-1762) incised the cornea with a keratome, enlarged the incision with scissors and extracted a cataractous lens. This was, of course, without anti- or asepsis or anaesthetic and it is said that of 210 cases in twelve years, 180 were successful. Daviel presented his technique at a meeting of l'Academie de Medicine in 1752 saying the operation was only for skilful and tested hands[1]. The procedure was opposed by Percival Pott among others, but interest was aroused among surgeons who had become interested in eye diseases, and its development has been a benchmark for ophthalmic surgery for 250 years.

In Edinburgh, the first surgeon to adopt the new technique was Thomas Young (1726-1783) who wrote in 1756 that his bad experiences of couching had made him give up that operation, "nor did the success of the ingenious *M. Daviel*, alter my resolution for a considerable time, till, at the importunity of some of my best friends, I consented to try this new operation. Six cataracts cast up last summer in the Royal Infirmary at *Edinburgh*, which I extracted"[2]. His first patient was Robert Laurie aged about 30 years on whose left eye he operated on 23rd July 1755. He suffered from photophobia for six weeks after which "he could see a pin in the sleeve of his own coat", - a simple if arbitrary measure of outcome.

Thomas Young is better remembered as being the surgeon who established the first maternity beds in the Royal Infirmary, following his appointment to the University chair of Midwifery in that same year, 1756. His father, George Young, was a surgeon and came from a family of brewers. Thomas, being the son of a member of the guild was exempt from examination on joining the Incorporation of Surgeons in 1751, and became its Deacon also in 1756. He was additionally a property developer and built houses off the Canongate in what he called New Street, but which might equally have been called Young Street after him. These were very fashionable, being occupied by several High Court judges. Young's experience in surgery, midwifery and ophthalmology was typical of how varied the caseload was at that time. Gradually over the next hundred years greater specialisation was to become the pattern. No portrait of him is known, but he is buried in the tomb of Sir William Forbes in Greyfriars Churchyard in Edinburgh

Before that, in 1737 William Porterfield (1696-1771) had published *Essays on the internal and external motions of the eyes.*[3] He held an MD degree from Rheims University, studied at Leyden, and had been professor of Physiology and Medicine at Edinburgh University for two years from 1724 and published his *Treatise on the Eye* in two volumes more than 20 years later in 1759.[4] We do not have evidence of any clinical involvement with ocular conditions and his writings include comparative physiology and affirms the principles of optics published by Sir Isaac Newton in 1666.

In 1777 Andrew Duncan Senior founded the Royal Public Dispensary in Richmond Street where the sick poor could receive medical treatment and this included ophthalmic treatment, and in 1785 Benjamin Bell included an entry of 250 pages on diseases of the eye in his six volume work, *System of Surgery.*

Infections of the conjunctiva, mainly trachoma, and trauma increased in Britain as a result of military campaigns in Egypt and Spain during the Napoleonic Wars. This led to the establishment of specialist hospitals, for example Moorfields Hospital in London, which dates from 1804, was followed by hospitals at Exeter, Bristol, Manchester and Birmingham by 1820. Signs of interest in the speciality are found in the theses for Doctor of Medicine degrees given by Edinburgh University and in Probationary Essays written by candidates for membership of the Royal College of Surgeons of Edinburgh.

One such was John Henry Wishart (c.1781-1834), apprenticed to Benjamin Bell in 1805 whose essay *De Ophthalmia* is in the College library. A fellow apprentice was James Wardrop who later worked at the Royal Public Dispensary and with his uncle Andrew Wardrop, also being a curator of the museum of the College of Surgeons before moving to London in 1808 in search of fame and fortune. He had a lifetime interest in ophthalmology and has been called the father of ophthalmic pathology. Wishart's family lived at Foxhall near Kirkliston and he studied in Vienna before returning to Edinburgh where he practised at 5 Nicolson Square, living later at 43 York Place. He was appointed to the surgical department of the Royal Infirmary in 1818. Four years later, in 1822, with John Argyll Robertson he founded the Edinburgh Eye Dispensary, with premises at 405 Lawnmarket. This preceded the establishment of the Glasgow Eye Infirmary by two years. Wishart was elected Chairman of the Royal College of Surgeons in 1820, and later became Surgeon to the King in Scotland. There are no known portraits of him, but his tomb is marked in Greyfriars churchyard.

John Argyll Robertson (1798-1855) obtained his MD from Edinburgh University with a thesis on *Ophthalmia*, and in 1822 wrote his probationary Essay on *The Anatomy and Physiology of the Eye* for which he was admitted F.R.C.S. Edinburgh. He later became President of the College in 1848. He lived in the new town at Abercrombie Place, then Queen Street, and retired to a house in St Andrews, Rose Park, where he died in 1855

A letter written in 1850 by Thomas Cunningham at 11 Lothian Street an Irish medical student records, "I was with the Surgeon of the Eye Dispensary at two very serious operations, on the eye, on Friday last - what I never saw since I commenced my study, so you see the longer we live we learn the more. I am very glad that I joined the Dispensary".[5] The concentration of clinical cases provided a source of teaching material for the large numbers of students in Edinburgh at that time. Their fees also provided revenue used to support the institution.

The Edinburgh Eye Dispensary remained in the Lawnmarket until 1862 when the building became unsafe and it moved to new purpose-built premises at the head of the newly constructed Lord Cockburn Street in number 54. A report in *The Scotsman* newspaper at the time stated "For half a century this Dispensary has been the means of affording relief in diseases of that most precious of senses the eyesight to the extent of 40,000 cases", (one thousand cases each year). "Two other most valuable and benevolent institutions have also been accommodated in the same building - the Ear Dispensary and the Edinburgh Dental Hospital.... As

an adjunct to our Medical School as well as a benefit to our poorer classes the combination of these institutions under one roof can not fail to be an object of interest in this new street occupying as it may be said to do a situation in the very heart of the city."[6] In 1888 it moved again to 31 Chambers Street, later the site of the Dental Hospital, and in 1899 to 45 Lauriston Place.

An alternative institution was the Edinburgh Eye Infirmary, founded by Alexander Watson (1799-1879) in 1834 at No 1 Elder Street near St James' Square in the New Town. The address was shared with a tobacconist, a tailor and a wright. Watson, previously surgeon to the Royal Dispensary and the New Town Dispensary, was appointed to the Surgical Department of the Royal Infirmary in the same year. He had published a *Compendium of the Diseases of the Human Eye* and an *Atlas of the Human Eye* and was a keeper of the Museum of the Royal College of Surgeons. He lived briefly in South St David's Street, then in 35 Dublin Street.

Five months after the Eye Infirmary opened its doors he published a report in the Medical and Surgical Journal. The objects stated were: "First, relief of those labouring under diseases of the eye and its appendages, secondly, the instruction of medical students in the nature and best modes of treatment of this class of diseases." It was funded by donations from the public and fees from medical students. "For the houses of the lower orders are not only ill-suited to the performance of, and recovery from, the more important and delicate operations on the eye; but in their after treatment such patients require to be removed from time to time from the noise and bustle of their families to situations in which they can obtain the necessary quiet and attendance for their favourable recovery".[7]

In the five months 257 outpatients and 11 inpatients had been treated, approximately half with ocular infections. Cataract operations numbered 7 by extraction and 5 by needling.

The report finishes with thanks to the Assistant and House Surgeon Mr J P Rae, and "It is always gratifying to me to express the obligation to Mr Cafe, cupper, for his readiness in having at all times attended to perform local blood-letting in this precise and effectual manner in patients who required it by which a great expense for leeches has been saved to the institution".

When Watson's wife inherited the estate of Denbrae, just west of St Andrews, he retired there and changed his name to Watson Wemyss.

By 1851 the Eye Infirmary had moved to 140 George Street, but not for long as it was moved again to a new building at 6 Cambridge Street in 1865. This building, outwardly looking like a typical tenement building with two maindoor flats and a common stair, was built to include patient accommodation. These features remain today and it is currently used as a psychiatric day centre. In 1922 the Edinburgh Eye Dispensary amalgamated with the Edinburgh Eye Infirmary in the Cambridge Street premises which by then also included the Ear Nose and Throat Infirmary and, from 1895, a Home for the Diseases of Women. An operating theatre was built behind the building in 1903. The Eye Infirmary continued there until the advent of the National Health Service. From 1949 until 1969 an orthoptic department, dispensing optician and refraction clinic for children continued there.[8] Dr Douglas Guthrie, founder of this Society, served as a director of this institution until its closure.

In 1855 the Managers of the Royal Infirmary established an Ophthalmic Department in Infirmary Street and appointed William Walker as the first ophthalmic surgeon. The son of John Argyll Robertson, the young Douglas, joined him in 1862. They both taught on Diseases of the Eye in the Extra-academical School of Medicine under the auspices of the Royal Colleges, and Douglas Argyll Robertson was eventually given a University appointment in 1884.

In 1879 the new Royal Infirmary opened in Lauriston Place and Argyll Robertson's ward, theatre and outpatient department were in the then Ward 2 at the east end of the surgical corridor. In 1903 the Moray Pavilion was opened with four wards, two theatres and two out-patient departments. The old Ward 2 later became the orthopaedic unit, followed by the department of oral surgery. The Moray Pavilion served until 1969 when the Princess Alexandra Eye Pavilion was built in the grounds of Chalmers Hospital to enable clearance of the site for the proposed rebuilding of the Royal Infirmary in Lauriston Place, an unfulfilled plan.

The present replacement building at Little France for the Royal Infirmary does not contain any provision for ophthalmic patients and the Princess Alexandra Eye Pavilion continues to serve this function from its site on the edge of the Meadows.

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LIKE IT OR LOATH IT, WE ALL SERVED

It is now 40 years since the end of National Service. The National Service era is unique in British history as the only period when there was conscription in peace time. All young men were called up for two years of full time service, followed by a spell in the reserves. A record of the experiences, reminiscences and memoirs of those doctors, newly qualified on call up, and from all three services, seemed something unique to collect. I approached the BMA and The Wellcome Institute for the History of Medicine and was given immediate support. What has resulted is a powerful collection. Much of the material is of such value that it would have been a tragedy if it had been lost.

Most of us at the time realised how lucky we were, having missed the war, and so we were content to serve. But, and especially as the decade of the 1950s passed, more and more young doctors were angry at "the waste of two years" that National Service meant, and became antagonistic.

Because of this, a significant number of those approached have failed to provide a reminiscence; a few have actively refused. Those who have written their recollections may thus represent only one side of National Service, the others have simply not contributed. From personal knowledge, I am aware that those working in large training depots were the least happy. This pattern applied particularly to the Army, but also the other two Services.

By contrast, Regimental Medical Officers (RMOs) with units enjoyed the camaraderie of the Regimental spirit, and many memoirs are full of praise and admiration for their Regiment or Corps. They had active training exercises, especially overseas. In the RAF, the majority were in home stations, (although many, as in the army, reached interesting overseas postings), but they shared the interest of the flying squadrons, and the pride that went with them. In the Royal Navy, service at sea was just what an enthusiast in the Navy looked forward to.

Postings to hospitals overseas, and to the then world-wide spread of the British Empire, opened a new and exciting life. When you grew up during the War there was no foreign travel. In many instances you did not even move far from your own home. Not only was there now the novelty of ship travel to the Middle and Far East, but on arrival there was the fascination of a foreign country. Different disease was a reality. Some parts - Korea and Malaya, but also Trieste and Aden, had active shooting warfare in progress. Real casualties occurred and had to be evacuated and treated. Because they were given huge responsibility abroad, which a newly-qualified doctor would never get at home, many felt their National Service had given their career a permanent direction and boost that would never have occurred otherwise. This comes out over and over again in the written records.

This collection has several elements worth recording in book form. First is the fact of conscription and the military service it involved, from basic training onwards. These are military history. The account of the 1st Argyll and Sutherland Highlanders in Korea, by Douglas Haldane, is outstanding. This battalion, with the Middlesex Regiment the first British infantry units committed at the harsh start of the Korean war, had as many casualties during its first three months as its sister battalion suffered in its corresponding period in the Crimea. The Middlesex Regiment too, shared this bad period. William Lewis Owen tells the story from the Naval side. His ship sailed along the coast of Korea prepared to "do a Dunkirk" if our side were beaten back to the sea by the North Korean army. His account is yet another unique one.

Active operations in Malaya, during the Communist inspired revolt, and in Aden and Trieste, are well covered. In the National Service period, from 1948 onwards, the Cold War was much more of a reality than

it became twenty and thirty years later, when the Soviet threat was seen as something delivered by rockets or by submarines. The early tension is seen in the records from the British Army of the Rhine and from Berlin.

The worth and variety of the medical clinical and public health memoirs themselves make the archive fascinating, even if no other aspects had been included. It was not only in Malaya and Hong Kong that medical disease and its management was recorded, and not only by two of several famous names, Sir David Weatherall and Sir Roy Calne, but by a wide range of men who in later years became noteworthy in all aspects of medicine. It must be remembered that the entire graduate output of British medical schools went into the Forces in National Service times and so the entire range of talents went with them. Another, whose Malayan experience set his whole subsequent career on its course, was Hughie Webb, first Professor of Neuro-virology at St Thomas's Hospital in London. Africa, from the Canal Zone in Egypt to Libya, Nigeria, the Sudan, Cameroons and Kenya, are covered by a range of doctors of high quality who later became physicians or neurologists or bacteriologists. Some memoirs came from the Caribbean and Central America. A few are of general practice among the families of servicemen, with all the problems which that included.

But perhaps the most fascinating part of the whole archive is its worth as social history. On the way to his posting, the young man's troopship tales are full of zest, and at times, scandal. As Captain Iain Stewart put it: "The troopship romance stuff was probably Mills and Boon or Barbara Cartland, as far as I could observe, but who knows. Troopships had a reputation for unleashing suppressed passion and desire among the travelling females...."

Postings, and their apparent irrationality, are commented on again and again. Lieutenant Andrew Graham, a Glasgow graduate, became friendly with John Smith, a London graduate, on their troopship to Egypt. When they arrived in the Canal Zone, Graham found himself posted to the Staffords as their RMO, Smith to the Highland Light Infantry. Neither could understand a word his patients were saying! An initial posting order requiring special instruction in tropical diseases was changed at the last moment to one to Wales or north Germany.

On arrival at the unit, the attitude of the National Service doctors towards their seniors in the Regular Services, non-medical as well as medical, will be another source of research surprise and amusement in fifty or a hundred years. One later highly distinguished professor's stories of his various wrong forms of evening wear at dinners on his troopship to the East is pure P.G. Wodehouse. The dismissive attitude of the senior Regular to the National Service doctor is well told by John Heber and others. (John Heber was a Guy's graduate, interested in anaesthetics). When in Malaya, he devised a neat, small, portable anaesthetic apparatus. "Splendid, Heber" said his C.O., "you can test it in the jungle." "But the jungle is full of terrorists, Sir" was John's reply. "Excellent, Heber" quipped back the colonel, "I see you read your intelligence briefings."

Sport, naturally, was a common source of activity, and several were posted to a place where the Service could make the most of a skill. Rugby, hockey, boxing, athletics and golf are all featured. The tie match in the Army Golf Championship at Royal St Georges in 1954, and the seven o'clock play-off, with senior officers having had a good number of drinks accompanying each match, went into the mythology of that sport for many years. Social life was full of spice. Drinking and smoking were commonplace, often to excess. Dr Ross Coles, later an ENT surgeon, remembers, on joining the Navy in 1953: "When I was first interviewed by the Captain, a man eventually to become a full admiral, he asked us three new officers whether we smoked. I did, but the other two did not. "Well, I expect all my officers to smoke. And the two of you who don't, you damn well learn to. When we entertain, you carry a cigarette case and a lighter and you offer cigarettes to our guests and smoke one yourself to keep them company." A direct order from a superior officer is to be disobeyed at your peril.

The life of spice that the young wives of Regular officers had on troopships en route to join their spouses on troopships has been alluded to. National Service doctors of course were never allowed to have their wives with them, or if they did, had to pay all travel, and accommodation rent. Comments of a few wives of National Service doctors are in the archive, with their views on their welcome, or lack of welcome, by Regular Service society.

There are some poignant anecdotes. Dr John Grant recalled a doctor in his own intake who was posted to a large military garrison in the south of England. He was allotted his room in the mess, and on his first evening, chummed up with a pleasant quiet medical officer in the next room after he looked in to borrow a match. They became firm friends, and shared the rest of their two years together. Some years later, his friend

confided that he had been so unhappy that he had been going to shoot himself, and would have done so the next day had the new doctor not appeared on the scene and restored his spirit.

RAF memories have their special interest. They, too, contain some hilarious recollections. But they also include accounts of those involved in important military research, one describing the Atomic tests at Christmas Island, another of the development at the Royal Aircraft Establishment in Farnborough.

The second smallest number came from the RN Naval Service. Here there was a rather different emphasis, National Service staff were described as RNVR and badged accordingly, although the fact that they were not volunteers is well shown. That these National Servicemen men enjoyed their period of full-time service is evident by the number who became active and enthusiastic members of the RNR afterwards.

There is a last, smallest group, of those who did conscription in another way. Dr John Scott, later a consultant psychiatrist, tells of his time as a miner, Dr Anthony Dixon, OBE, tells of his active service with the British Red Cross in the Far East, and Dr James Macgregor, OBE, of his in Sierra Leone as a Colonial Medical Service doctor, and later in the Solomon Islands, make up this group.

At the end of their two years, or during their service, many National Servicemen were given a range of inducements to sign on for Regular commissions. The best story of all these came from Captain Bryan Ashworth, whose Commanding Officer told him in Kaduna: "Ashworth, you could finish up a brigadier if you stayed in." "But I don't want to finish up as a brigadier, Sir" replied Bryan. He became a consultant neurologist in the Royal Infirmary of Edinburgh.

I have written this short account of the recollections of the conscript doctors from the United Kingdom of Great Britain and Northern Ireland in the National Service Era at the request of the British Medical Association and Wellcome, in order to make known the wishes of a very large number of the contributors, that their memoirs are recorded not in a closed archive, but in book form. I thank them each and every one very sincerely for the time and trouble they went to, in producing records of the highest standard. The age that they described as theirs belongs to a half century ago; national characteristics of loyalty, patriotism, *caritas,* were present then, without doubt, and disrespect, narrow nationalism, the need for finding scapegoats and the constant urge for litigation, were absent. Sad events and accidents were overcome without "counselling" by eager enthusiasts, and those involved recovered more quickly with comrade compassion. There is much, of course, not recorded here. That makes up the *real* magic of the memoirs. But the public will have to wait a further half-century before these become available. In the meantime, we who shared the National Service experience will have many a good laugh as we have our memories stirred. We hope others will share our enjoyment too.

The Conscript Doctors: Memories of National Service, compiled and edited by John Blair was published in 2001 by The Pentland Press Ltd, Bishop Auckland Durham. ISBN 1 85821 946 9

THE ONE HUNDRED AND SIXTY FIFTH ORDINARY MEETING

The One Hundred and Sixty Fifth Ordinary Meeting of the Society was held at the Royal College of Physicians and Surgeons in Glasgow on 22nd March 2003. After lunch, two papers were given, Dr Ian Gregg talked on Millipedes and Medicine and Dr David Wright talked on Leeches - Past and Present.

LEECHES PAST AND PRESENT

Although the first thing that may come to mind is a rather creepy creature with a consuming interest in blood, I hope to show you that the subject is fascinating, with a number of modern implications as well as many historical aspects. I will start by considering some meanings of the word Leech. Leech has been used for centuries to describe a doctor or physician. A Leech is also an annelid or segmented worm of the class Hirudinae, which has a sucker at each end of its body and feeds on the blood or tissues of other animals. The word has in addition been used to describe a person who clings to or preys on another person.

Leech as physician comes from the old English or Anglo-Saxon Laece, a word meaning to heal. A number of northern European languages have words of a similar nature including the modern Swedish Läkare for doctor. The Leech book of Bald is an Anglo Saxon medical manuscript from the early 10th century. Bald was a physician and the book was written for him by Cild, a monastic scribe. The book contains a range of

information, from paragraphs taken from standard Greek authors, such as Paul of Aegina, to charms of Scottish origin.

"If a horse or other neat be elf shot, take sorrel seed and Scottish Wax, let a man sing twelve masses over it, and put holy water on the horse, or on whatsoever neat it be, have the worts always with thee" [1]

There are stories in Celtic and Norse fables of a legendary healer who came by his powers in a magical way. In Gaelic tales he was known as Fearchar the Leech and the legend merges with fact with the grant of lands in the north of Scotland in 1379 by Robert II to "Ffercado medico nostro" (Fearchar our physician). Another charter in 1386 grants lands to "our esteemed and faithful leech Fearchar" In succeeding centuries many noble Gaelic families had such physicians, who often inherited posts. The most famous hereditary physicians were various branches of the Beaton family."[2]

Leeches as bloodthirsty creatures are annelid or segmented worms. They are related to earthworms. There are perhaps a thousand different species, mostly tropical.

Leeches have suckers at each end of the body, which help them attach themselves to their prey. The mouth is usually at the smaller end, and when attached, the mouth allows the animal to puncture the skin and extract blood. This process is helped by a variety of substances produced in leech saliva, which cause local anaesthesia and anti- coagulation.

Leeches have been used in medicine for many centuries and the usual species is Hirudo medicinalis, the medicinal leech, although at times the Horse leech (Haemopsis sanguisuga) has been used. Where there is written or pictorial evidence of human activity, there are records of leeches. Drawings of leeches have been found in Egyptian wall paintings. There are written records of the use of leeches in ancient Indian and Greek Roman and Arabic texts. [3] Leeches were used for a variety of conditions including helping wounds to heal, to treat headaches and to adjust the various humours in the body.

By the 17th and 18th centuries leeches were very popular, as blood letting was one of the main therapeutic options. Leeches were easier to use than the lancet, which required skill and the presence of suitable veins. They were often employed in women and children, though William Buchan's Domestic Medicine encouraged caution.

"Children are generally bled with leeches. This, though sometimes necessary, is a very troublesome and uncertain practice. It is impossible to tell what quantity of blood is taken away by leeches; besides the bleeding is often difficult to stop and the wounds are not easily healed" [4]

John Hunter used leeches on the temples to deal with eye inflammations, on the scrotum for testicular gonorrhoea and on the perineum for inflammation of the bladder. [5] Leeches are particularly effective in blood letting, because of the oozing that takes place after the leech detaches itself, following its blood meal of about 5 mls. Over the next 6 hours up to about 50 mls may ooze from the wound, so that 6 leeches can produce a blood loss of about 300 mls. [6]

Blood letting with leeches reached its peak in the early 19th century and is generally associated with Francis-Joseph-Broussais (1772-1838). He was chief physician at the Paris Val de Grace military hospital and he supported the theory that disease depended on irritation particularly of the stomach or intestine. He believed that the way to health lay in adopting an anti-phlogistic approach in which the patient was weakened by a combination of bloodletting and starvation. He applied up to 50 leeches at a time. From the illustration already given this suggests that blood loss may have been of the order of several litres in these circumstances, presenting a considerable hazard to life. The consumption of leeches in France went up from 2-3 million per year in 1824 (when France was a leech exporting country) to 41 million a year 10 years later (with some 30 million being imported in 1837). [7]

On the web site of the UCLA Biomedical library (History and Special collections) there are quotes from "A treatise on the Medicinal Leech" by James Rawlins Johnson, a book published in London in 1816. They include practical advice from the early 19th century on the use of leeches.

"The medicinal leech is common throughout the whole of Europe, but more so in the southern than in the northern parts. Formerly this species was very abundant in our island, but from their present scarcity, owing

to their being more in request among medical men, and to the rapid improvements which have of late years taken place in agriculture, particularly in the draining and cultivation of wastelands, we are obliged to receive a supply from the Continent, chiefly from Bordeaux and Lisbon."

"When the application of leeches is judged expedient, the part on which it is intended that they shall fix, should be as clean as possible: it should therefore be first washed with soap and water, and afterwards with water alone; which shall be the more necessary, should any liniment or embrocation have been used."

"Leeches are commonly affixed by inverting a wine glass containing as many as required, upon the part affected. The great disadvantage of this practice is that some of them frequently retire to the upper part of the glass and remain at rest, defying all attempts to dislodge them, without incurring the risk of removing those that may have fastened."

"Some little dexterity is requisite to make the leech attach itself at the first point of contact, or it often happens that it will pass over a great extent of surface, without evincing the least disposition to bite. In this case, puncturing the part with a lancet offers the only chance of success"

"The leech when filled, contains from half an ounce to an ounce of blood; when a leech quits the part to which it was affixed, and the blood continues to flow longer than required, the application of a slight compress will usually restrain it; but should this at any time prove ineffectual, we must have recourse to a compress steeped in some styptic such as brandy or spirits of wine" [8]

From the mid 19th century, there was a gradual decline in the use of leeches. There were a number of reasons for this. Leeches became less easy to obtain, while bloodletting became less popular, probably because of its over-excessive use. Leeches were used for more specific conditions, for example for the treatment of swellings of various origins, including abscesses, and of pain. Lauder Brunton's book "Therapeutics of the Circulation", published in 1916, contains the following

"The relief which is obtained by the application of half a dozen leeches to the side, in cases of severe pleurisy, is very extraordinary; and it is difficult indeed to see how the comparatively small quantity of blood which they extract should relieve the patient so much; but there can be no doubt about the fact that the relief they afford is enormous. Their application over the mastoid process in severe headache or in meningitis, and over the cardiac area in pericarditis or the liver in hepatitis, especially if accompanied by perihepatitis is very useful" [9]

As the scientific breakthroughs of the 19th and 20th centuries began to provide logical therapeutic measures for hitherto untreatable disease, leeches became old fashioned and used less by the practitioners of what has become "conventional" medicine.

An interest developed in the anticoagulant action of leech saliva and its constituents such as hirudin, both in the treatment of deep vein thrombosis and to allow dialysis without clotting. These developments were overtaken by the availability of heparin and Warfarin, which were easier to obtain, more dependable and safer. In 1960 Derganc and Zrdravic described, in the British Journal of Plastic Surgery, the use of leeches to relieve venous congestion in skin transplants. Since then, there has been a steady increase in the use of leeches in a variety of plastic techniques, including breast reconstruction and the re-attachments of digits. After such surgery, although arterial inflow may be maintained, venous drainage may not be enough to prevent congestion. The beneficial action of leeches comes from removing that congestion, not only because of the few mls of blood removed by the leech, but also from the continued oozing and the presence of local vaso-active and anti-coagulant substances. Provided the treatment is carried on for a number of days, viability can be maintained until new vessels can grow in to the region affected by the surgery.

Because of the success of leech treatment in this way there has been an increasing demand for high quality sterile leeches. This has been largely met by an enterprising firm in South Wales called Biopharm and a company in the USA called Leeches USA. The man most responsible for popularising the use of leeches and setting high standards is Roy Sawyer of Biopharm. A leech enthusiast, he has published dozens of papers on different aspects of leech anatomy, physiology, pharmacology and history. Both companies have excellent web sites, which list indications for the use of leeches, their mode of action, costs and details of supply. There is information on how to store leeches, apply them and get rid of them.

The indications for leeches, apart from plastic and reconstructive surgery, now include other haematomas, for example of the pinna, for the treatment of paronychia and for the pain of osteo-arthritis.

There is also great interest in the various pharmacologically active compounds in leech saliva, which affect the coagulation process. Biopharm's website[10] contains details which augment the advice of James Rawlins Johnson, given nearly two centuries previously.

"It is best to use the hungriest (normally the smallest) leeches first. The head (or biting end) of the animal can be recognised by its searching movements. Clean the skin with soap and water to remove all substances with strong odour or taste such as traces of operative prep fluids or saline. Rinse cleaned areas with plain water. Dampen a gauze-square with water and cut a 1 cm hole in the middle. Place the gauze on the patient with the hole in close contact to the area to be treated. Steer the head of the leech towards the hole. Attachment generally takes place quickly. However if the leech is reluctant to bite, make a small needle prick on the skin (which should result in enthusiastic attachment). Avoid wandering. When the leeches detach, they should be put in to a labelled jar. Return unused leeches to the pharmacy in sterile water. Leeches which have been used should be disposed of by initially narcotising them in 8% alcohol and then placing them in 70% alcohol for 5 minutes and then discarding them via a sluice or incinerator"

Leeches can and are being used, particularly in Eastern Europe, in less scientific ways. I came across one web site[11] *entitled "The leech could help to everybody.... and even the cat"*

This has the following paragraphs: The leech has cured the cerebral paralysis. The leech helps to give birth. The leech has saved the Persian Cat. The leech has even cured the epileptic fit (in a 6 year old poodle called Luisa)

One of the more unusual papers on leeches is one by Baerheim and Sandvik, published in the 1994 Christmas edition of the BMJ, on *"The Effect of ale, garlic and soured cream on the appetite of leeches"*. The work had been carried out because these substances had been suggested to affect the behaviour of leeches. In summary, the research showed that beer made the leeches' behaviour rather erratic, soured cream had no helpful effect and garlic killed the two leeches exposed to it.

How leeches are kept is important for their well-being. It is important for their security as well, because they might escape if not physically prevented. Biopharm and Leeches USA provide the means of safe keeping of leeches. There are several leech websites which deal with other leech species used as bait for fishing. On one of these websites, I came across some practical advice on keeping leeches at home. It condemned the use of chlorinated tap water but said that the ideal circumstances were when the house water came from a well. In a house with well water, the best storage place was in some old tights placed in the cistern of a toilet, where fresh water would be introduced with every flush. The advice was not to tell your wife about this, if you had any doubts about her strength of character or the quality of her tights.

In the past leeches have been kept in a variety of containers, of which there are two main types. Large pottery jars, which were usually prettily decorated and marked LEECHES in capital letters, were often kept in hospital pharmacies and chemist's shops. Smaller containers were either made of glass, with rims which could be covered with gauze or net or of metal, which meant that they were more robust and would allow one or two leeches to be carried by a doctor to a patient.

As antiques, these containers are now highly sought after, with a number of websites, advertising the sale or purchase of examples. There may also be various bleeding gadgets some of which were known as artificial leeches. There is a flourishing trade in recently made leech containers, some deliberately sold as high quality copies and some downright forgeries being passed off as the real thing. The Royal Pharmaceutical Society currently sells modern copies of antique leech jars for £50.

A literature search for leech will sooner or later come across the name of John Leech. There are enough medical connections about him to deserve a brief mention. John Leech was born in 1817 in London and went to school at Charterhouse, where he was a student with WM Thackeray. At the age of 16 he went to St Bartholomew's Hospital to study medicine. His teachers soon became aware of the wonderful quality of his anatomical drawings and began to commission him to paint portraits. He was successful enough to decide to leave medical school to further his career as an artist. He did drawings of street characters such as cabmen, policemen and street musicians and his work was published in a number of magazines. In 1841, he attracted the attention of Mark Lemon and Henry Mayhew who were recruiting artists for their new journal Punch. Over the next 23 years, Leech produced 3000 drawings and 600 cartoons for Punch. He held radical views and made many political points but they were pervaded by his gentle humour and he contributed considerably to Punch's success. His illustrations for Dickens's A Christmas Carol added much to that book's great

popularity and when he died prematurely in his 40s, in 1864, there was a national sense of great loss, which is captured in John Brown's essay, written after his death.

"We all remember the shock of his death: how everyone felt bereaved,- felt poorer;- felt something gone that nothing could replace,- some one that no one else could follow."[13]

I also came across a few poems on the subject of leeches and, to conclude, here are some extracts of these, two of which were written by doctors who were themselves important figures in the history of medicine. First however, a little poem about the practical difficulties of getting leeches to take blood, which was written by Henry S Leigh (1837-1883) and is entitled To a Timid Leech[14]

Nay, start not from the banquet where the red wine foams for thee,
Though somewhat thick to perforate this epidermis be,
'Tis madness, when the bowl invites, to linger at the brink,
So haste thee, haste thee, timid one. Drink, pretty creature, drink!

I tell thee, if these azure veins could boast the regal wine
Of Tudors or Plantagenets, the draught should still be thine!
Though round the goblet's headed brim plebeian bubbles wink,
'Twill cheer and not inebriate. Drink, pretty creature, drink!

Perchance, reluctant being, I have placed thee wrong side up,
And the lips that I am chiding have been furthest from the cup.
I have waited long and vainly, and I cannot, cannot think
Thou would'st spurn the oft repeated call: Drink pretty creature, drink!

While I watch'd thy patient struggles, and imagined thou went coy,
'Twas thy tail and not thy features, that refused the proffer'd joy.
I will but turn thee tenderly-nay never, never shrink-
Now once again the banquet calls; Drink pretty creature, drink!

David Rorie was a doctor, a poet and a great contributor to the history of medicine in the first half of the 20th century. He practised in Fife and Aberdeenshire. Many of his poems are in Scots and draw on stories from his medical life. One such is Tam and the Leeches.[15] This tells the story of Tam MacPhail who developed severe indigestion one day after eating a big meal of early tatties. He was in such distress, roaring with pain, that the next door neighbour went running for the doctor.

The doctor oxter'd Tam till's bed
Finger't his wame an' shook his head;
"We who pursue the healing art,
See youth commence and age depart,
Pills we prescribe and pulses feel,
Your systems know from scalp to heel!
And here? Potato indigestion,
Of that there's not the slightest question,
While, what my great experience teaches,
Is most relief is got from leeches"-
"Awa'" yells Tam, "Fesh hauf a dizzen!
O haste ye, ere I loss my rizzon!"

So the leeches are fetched from the druggist

An' noo my billies, draw a veil,
Till mornin's licht, owre Tam MacPhail,
Till aince again the doctor cam'
To see what cheenge was wrocht in Tam.
'Twas nine o'clock he stapt in-bye,
Relieved to hear nae awesome cry.
"Well, well MacPhail" the doctor says,
"My treatment's worthy of all praise!

I left you- why 'twas like a riot!
I see you now, contented, quiet.
Far, very far, our knowledge reaches!
How did you get on with the Leeches?"
Tam ne'er replied, but turned his back,
Wi' tearfu' een 'twas Jean wha' spak,
"Eh, Doctor!- Sic an awfu' cure,
I ne'er saw gi'en to rich or puir,
For when we saw the ugsome beasts
It gart the herts rise in our breasts!
But Tam, wha tak's your word for law,
Juist swalla'd doon the first pair raw!
Yet try's he micht, an' sair he tried,
He had to hae the last four fried!"
The doctor turn'd him on his heel,
An' though puir Tam looked rale no-weel,
He couldna trust himsel' to speak,
The tears were rinnin' doon his cheek
An'a' that day was sair forfaughen
Wi' tryin' to haud himsel' frae lauchin.

The last poem is by another doctor poet who features strongly in the history of Medicine, Oliver Wendell Holmes. It is entitled Rip Van Winkle MD and is about an imaginary country practitioner who goes off to sleep for thirty years and when he wakes up starts treating patients in the old fashioned way that he was used to. This included leeches, blisters and calomel. When the other local doctors heard of this they came without delay:

"Young Dr Green and shrewd old Dr Gray—
They heard the story—"Bleed!" says Dr Green,
That's downright murder! Cut his throat, you mean!
Leeches! The reptiles, Why, for pity's sake,
Not try an adder or a rattlesnake.
Blisters! Why bless you they're against the law.
It's assault and battery, if they draw!

But Dr Gray has a different perspective

"Stop! Says Dr Gray—
"The story is you slept for thirty years;
You must have slumbered most amazing sound;
But sleep once more till thirty years come round,
You'll find the lancet in its rightful place,
Leeches and blisters rescued from disgrace,
Your drugs redeemed from fashion's passing scorn,
And counted safe to give to babes unborn."

I will finish on that thought, hoping that I have shown you that leeches, with their rather chequered history, are worth rescuing from disgrace.

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THE TWELFTH HALDANE TAIT LECTURE

The Twelfth Haldane Tait Lecture was held on 7th May 2002 at the Pollock Halls, Edinburgh. Professor Robert Kendell had originally accepted an invitation to give this lecture, but sadly, had died earlier in the year. Dr Charles Bryan, President of the American Osler Society, had therefore agreed to speak. However, on the morning of the meeting, he telephoned to say that he was unable to leave the USA because of bad weather. In these circumstances, Dr David Wright gave a paper entitled The Nature of Anaesthesia.

THE NATURE OF ANAESTHESIA.

This paper considers the contribution of plants and animals to the understanding and practice of anaesthesia. It falls naturally falls into three parts. The first looks at some common drugs and traces their plant origins. It reminds us about our history and takes us to different parts of the world. It wanders down some tracks that take us away from hospitals, anaesthetic rooms and operating theatres but tries to keep modern relevance in mind. The second looks at what we have gained from animals, particularly in helping us towards a better knowledge of physiology and pharmacology. The final part tries to draw together some common threads to produce a few tenuous conclusions.

It is not a scientific paper. It is instead a personal selection which offers a relatively light hand on nomenclature. It extends into intensive care as well as anaesthesia. Its purpose is to provide an interesting overview, and, by encouraging a sympathy for history and natural history, to recognise the contributions of others in fields which seem different from medicine but which may have such relevance that we do well to think what we can learn for the future.

I will start with some common drugs which might be used for a routine list for a session in the operating theatre, atropine, ephedrine, morphine, Propofol and Vecuronium. The first, Atropine, was obtained from the leaves and the berries of deadly nightshade, Atropa belladonna. The plant was named by Linnaeus after one of the Fates, Atropus, who cut the thread of life. Deadly nightshade is a member of the plant family known as Solanaceae. Other members of the family include Henbane, Hyoscyamus niger, and the mandrake, Mandragora officinarum.

These plants have been a cause of poisoning, both deliberate and accidental, for many centuries and many myths and traditions are associated with them. The mandrake, which was, with opium and hemlock, a major constituent of the "Soporific sponge" in the days before modern anaesthesia, had a particularly lurid history. The plant was supposed to look like a human and to shriek when it was pulled from the ground. To hear the shriek was to risk death and thus, when harvesting the plant, a dog was tied to the root to pull it out, while the owner with ears covered, waited anxiously.

Deadly nightshade, mandrake and henbane contain hyoscine and other tropane alkaloids and these were major ingredients in witches' brews. At some stage in history it was discovered that mixing extracts of the plants with fats and oils, to make ointments, allowed absorption from the skin. A detailed description comes from Anres Languna, physician to Pope Julius III, in 1545

"I managed to obtain ... (a certain green unguent)... with which they were annointing themselves ... composed of hemlock, nightshade, henbane and mandrake)... I used (it) to anoint, from head to toe, the wife of the hangman (as a remedy for her insomnia). On being anointed, she suddenly slept such a profound sleep with her eyes open like a rabbit (she also fittingly looked like a boiled hare), that I could not imagine how to wake her." [1]

She woke 36 hours later and exclaimed *"Why did you wake me at such an inopportune time. I was surrounded by all the pleasures and delights of the world"* [2]

Pictures of witches often show them with ointments being applied to skin and their flights were presumably often more figurative than factual. The effects of the alkaloids can be gathered from an account of an experimenter in the 1960s who inhaled smoke from burning henbane seed.

"My teeth were clenched and a dizzy rage took possession of me... I was permeated by a peculiar sense of well-being and the crazy sensation that my feet were getting lighter... I was seized with the fear that I was falling apart. At the same time, I experienced an intoxicating feeling of flying... I soared where my hallucinations- the clouds, the lowering sky, herds of beasts, falling leaves... streamers of steam and rivers of molten metal -were swirling along" [3]

Hyoscine, absorbed through the skin, is of relevance today. Hyoscine patches are in the BNF, with Hyoscine recommended as the most effective treatment of motion sickness. The Apollo astronauts played a role in developing a modern association of hyoscine with flying, when Band-aids coated with hyoscine were used to treat the nausea associated with weightlessness. Atropine and hyoscine are now obtained commercially from Queensland, from the native Australian corkwood Duboisia hopwoodii. Atropine and hyoscine block the effects of acetylcholine at muscarinic sites. Muscarinic sites are so called because of muscarine, an active principle isolated from the Fly Agaric, Amanita muscaria.

This toadstool, which usually grows under trees, is widespread and is recognised throughout northern Europe and Asia for its hallucinogenic potential. This comes from ibotenic acid and muscimol, which are gamma amino butyric acid (GABA) blockers. The Lapps and the people of Siberia have long used this fungus as an intoxicant. They may have started doing this after observing reindeer, which also seem to enjoy the experience.

Filip von Strahlenberg, a Swedish colonel, was held captive by the Koryak tribe in Siberia for many years, but when freed was able to describe local practice, in his memoirs in 1730.

"Those who are rich among them, lay up large provisions of these mushrooms, for the winter. When they make a feast, they pour boiling water upon some of the mushrooms and boil them. They then drink the liquor, which intoxicates them. The poorer sort ... post themselves, on these occasions, round the huts of the rich, and watch the opportunity of the guests coming down to make water; and they then hold a wooden bowl to receive the urine, which they drink greedily... and by this way they also get drunk" [4]

It is thought that the reason for this is that the ibotenic acid breaks down to the more potent muscimol, which is excreted, mostly unchanged, in the urine. Those who have eaten the fungus become stuporose at first and experience vivid hallucinations. On waking, they often have difficulty in perceiving distance and adjusting movement to what is necessary, taking large leaps to overcome the smallest obstacle. It is thought that Lewis Carroll in "Through the Looking Glass" is speaking from personal experience when he wrote

"Come, my head's free at last" said Alice in a tone of delight, which changed to alarm in another moment, when she found that her shoulders were nowhere to be found: all she could see, when she looked down, was an immense length of neck, which seemed to rise like a stalk out of a sea of green leaves that lay far below her." [5]

Ephedrine dates back to the earliest days of Chinese medicine. The Shen Nung herbal was written about 200BC and mentions some 365 items including Ma Huang, a mixture of ephedra species, Ricinus communis, the Castor oil plant and Papaver somniferum, the opium poppy. The Ephedra family is also known as joint pines, which are shrub like and grow in rocky places. Ma Huang has been used in Chinese medicine for centuries for respiratory complaints, but ephedrine was not isolated until 1887. Ephedrine is related to adrenaline, which was isolated some 10 years later in 1897, and to salbutamol, a relatively modern development, which was produced in the search for a drug working primarily as a bronchodilator.

Morphine was obtained from opium, the dried milky exudate that emerges if unripe seed capsules of the opium poppy, Papaver somniferum are scarified or scored. This contains about 25% by weight of opium alkaloids (of which morphine 17% and codeine 4% are the most important.). Opium has a long history as an analgesic but was also used in medicine as a sleeping draught or as treatment for diarrhoea. From the sixteenth century it became popular as laudanum (from the Latin laudare to praise). Morphine itself, was first isolated

in 1804 and in 1874 diacetylmorphine, diamorphine was first made. Diacetylmorphine was marketed by the German company Bayer in 1898 under the name Heroin, a heroic drug, and it was widely advertised as a cough remedy without, at first, its extremely addictive nature being appreciated.

Propofol, the intravenous anaesthetic agent, has to be presented in an emulsion and soya oil helps to bring this about. Soya comes from the Soya bean, which is grown world-wide and has a variety of uses from animal food to tofu and soy sauce.

Vecuronium is one of the currently used muscle relaxants, which are derived from tubocurarine. It is this latter whose history I would like to trace back to its plant origins. The story includes travellers in South America, arrow poisons and the early use of curare before it became established in modern anaesthesia. In the first sentences of his book, *"Wanderings in South America"*, Charles Waterton described the object of his travels as the collection a quantity of the strongest wourali poison and a journey to the inland frontier fort of Portuguese Guiana. He started his first journey in 1812. His book gives detailed descriptions of how the Indians used wourali, the arrow poison that he had come to get. He learnt of the identification of plants, the careful preparation of the extracts, the construction of arrows, their detachable tips and of blowpipes and bows to deliver them. He was able to bring back to England samples of wourali, which he was in due course able to use in experiments. In one of these he described how

"A she ass received the wourali poison in the shoulder and died apparently, in about ten minutes. An incision was then made in its windpipe and through it the lungs were regularly inflated for two hours with a pair of bellows. Suspended animation then returned. The ass held up her head and looked around; but the inflating being discontinued, she sank once more in apparent death. The artificial breathing was immediately recommenced and continued without intermission for two hours. This saved the ass from final dissolution. She rose up and walked about; she seemed neither in agitation nor in pain. The wound through which the poison entered healed without difficulty. Her constitution was however so severely affected that it was long a doubt if ever she would be well again. She looked lean and sickly for about a year, but began to mend the spring after and by midsummer had become fat and frisky." [6]

She recovered sufficiently to be able to travel from London to Waterton's home, Walton Hall, near Wakefield. She was called Wouralia and lived for another 25 years.

Different recipes for the arrow poison used different plants, but the two most important were Chondodendron tomentosum and Strychnos toxifera. Samples of arrow poison finding their way back to Europe were known as tube-curare, (mainly Chondodendron), pot-curare and calabash curare (mainly Strychnos). Calabash curare was used by Claude Bernard in experiments in the middle of the nineteenth century. He showed that the paralysis which it induced was not caused by problems with conduction along nerves and that directly stimulated muscle could contract, so that the paralysis was caused by a problem between nerve and muscle, not centrally as had been thought.

Various preparations were used in clinical medicine, from time to time throughout the nineteenth and first forty years of the twentieth century, for such conditions as tetanus. It needed another characterful South American traveller, Richard Gill, an American, to lead the moves towards modern muscle relaxants. With an interest related to a spastic condition he had developed, he brought back about 30lbs of curare from Ecuador to the USA but failed initially to interest any of the drug companies. However an account of his adventures, "White Water and Black Magic" was widely read and eventually two companies, Squibb and Burroughs Wellcome began experiments.

As a result of these, intocostrin was used by Griffiths and Johnson and subsequently tubocurarine became available, allowing Gray and Halton from Liverpool to pioneer the use of balanced anaesthesia. Further developments from the 1960s onwards included pancuronium, Vecuronium, Rocuronium and the novel drug Atracurium.

I would now like to briefly consider some drugs used outside theatre, in intensive care, Amiodarone, Aspirin, Digoxin, and Warfarin. Ammi visnaga is a Mediterranean plant known in Egypt as Khella. For centuries it has been used to relieve renal colic. One day in 1945 a lab technician in Cairo with renal colic and ischaemic heart disease treated himself with khella. When he returned to work, his boss, who was GV Anrep, the Professor of Pharmacology in Cairo, noticed that the technician's angina had improved. Anrep started to work on the active principle in Khella, khellin, and found that it was a potent coronary vasodilator. Subsequent work on khellin led to the synthesis of new drugs, one of which was amiodarone and another of

which was nifedipine. These are not extracted from the plant but have been developed synthetically. Active principles isolated from the plant have acted as a stimulus for a search for many other compounds.[7]

Aspirin has come by rather tortuous route from Meadowsweet, a common British plant, found typically in damp situations. From the seventeenth century onwards, Quinine was used in the treatment of fevers. The powdered bark of the willow tree was used as a substitute for quinine partly because it had a bitter taste. The active principle in willow bark, salicin (from Salix, the Latin name for the Willows) was isolated in 1830 and used in the treatment of rheumatic fever. Salicin is converted to salicylic acid in the body. Salicylic acid was originally produced from salicaldheyde, which was obtained from Meadowsweet, whose Latin name was then Spiraea ulmaria. (It is now known as Filipendula ulmaria.) Sodium salicylate was synthesised and became available for clinical use. A chemist working for Bayer, Felix Hoffman, found that Sodium salicylate caused gastric irritation in his father who was taking it for arthritis and synthesised acetylsalicylic acid in 1899. He called it Aspirin. The "A" comes from acetyl, the "spir" comes from spiraea and the "in" is a common ending for drug names. [8]

The story of William Withering, who learnt of the potential of digitalis for use in heart failure from an old lady in Shropshire, is familiar. Later work by James Mackenzie showed its value in atrial fibrillation. Digoxin is still obtained today from foxgloves, mainly Digitalis lanata.

Sweet clover, Ribbed melilot, Melilotus Officinalis, was widely planted as a fodder crop in the USA, but it led to the appearance of a disease in animals fed on it, if it was stored and became mouldy. The naturally present coumarin, which gives the smell to new mown hay, is altered by fungal action to bishydroxycoumarin. Development of this knowledge led to the production of synthetic coumarins of which one, Warfarin was found to be an excellent rat poison. (In the name Warfarin, WARF comes from the Wisconsin Alumni Research Foundation and ARIN comes from coumarin) When an army recruit took it in a suicide bid and failed to die, it was realized that it had a reasonable human safety profile and it has been used clinically since 1954. [9]

Turning now to contributions from animals. Firstly, animals can provide material, such as hormones, which can be used therapeutically, or toxins, which can help us to understand physiology and pharmacology. Secondly, animals themselves can act as substitutes for humans. The words "guinea pig" express this. We have almost forgotten the original experimental guinea pigs and may use the words for any animal (even a human) being used to test something, whether that something is a drug or an idea. Animals have been used in this way to extend our knowledge of physiology and pharmacology at little cost to ourselves. Banting and Best used a dog in their pioneering work on insulin. Insulin is an example of a therapeutic agent originally derived from animals. Others are Heparin and Protamine. The cane toad from Queensland is an example of an animal that produces toxins, its skin being extremely poisonous. The animal and its venom go together quite literally, in the expression, "you poisonous toad". A number of amphibians produce poisons such as tetrodotoxin, which is also the lethal agent in the puffer fish. Compounds like this and snake venoms have helped to bring greater understanding to studies of nerve and muscle function.

Thus we have seen that materials from plants and animals can help us to gain a greater understanding of physiology and pharmacology. Such materials can also provide us with new therapeutic agents or can guide us in new directions. Why do plants and animals produce such poisons? They are often complex compounds, which are not involved in metabolism. They make act as defence against predators, or they may be used for attack against prey. The more toxic they are the more efficient they will be. For whatever reason they are produced, if they bring a benefit to the organism that possesses them, this is likely to produce an evolutionary advantage.

This reminds us what we mean by the process of evolution. There need to be variations that are transmissible from generation to generation. There needs to be some form of non-random selection that discriminates between the variations. This will lead to survival of those which best fit their environment. These principles of evolution can be applied to the development of medical treatments, as well as of species of plants and animals. By trial and error, for thousands of years, different medical treatments have arisen. The ones that seem to work are passed down from generation to generation. The one that don't work are less likely to survive. An important clue to efficiency is if the same principles of treatment exist in widely different cultures.

How useful is an awareness of our heritage from natural history? One view of knowledge and ignorance is that there are four kinds of ignorance. There are things that we think we know but we really don't know. (This might be called ignorance masquerading as knowledge). There are things that we know that we don't know. (Overt ignorance). There are things that we don't know that we don't know (Hidden ignorance). There are things that we think we don't know but we actually do know (Knowledge masquerading as ignorance)

Plants and animals, with their great diversity, still offer us a chance to remedy these gaps in our knowledge. This is because they have helped us to a better understanding of things we thought we knew all about, but didn't, of things that we wanted to explain but couldn't, of things that we hadn't even dreamt about and of things that others had known for centuries but we hadn't believed. As we begin to understand the significance of this, the diversity of animals and plants and their habitats are being destroyed at an ever-increasing rate. Also threatened, by our so-called civilisation, are the communities who have preserved practical knowledge of plants and animals for countless centuries and are disappearing, sometimes in a generation.

Thus, in conclusion, natural history can play a major role in drug development. There is still great potential, but time may be running out. We probably have more knowledge than we think. We should look for new solutions to our problems and we should be looking for new problems. We should acknowledge what we have inherited and look after it responsibly

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THE ONE HUNDRED AND SIXTY SIXTH ORDINARY MEETING

The One Hundred and Sixty Sixth Ordinary Meeting of the Society was a joint meeting with the Pybus Society of Newcastle, held at the Borders General Hospital, on 14th June 2003. There were two papers, one by Dr Michael Williams on Duff House and the Treatment of Diabetes and on by Dr Rufus Ross on Doc Holliday, Gun-totin' Dentist of the West.

DOC HOLLIDAY (1851-1887) GUN TOTIN' DENTIST OF THE WEST

A number of biographies have been written on Doc Holliday, most of which have suffered from lack of knowledge, overactive imagination or deliberate fabrications. The account written by a cousin Karen Holliday Tanner, based on the family memorabilia and history, is reckoned to be the most authentic account of Doc Holliday's life. He was born at Griffin, Georgia on 15 August 1851. John Henry Holliday was born with a cleft palate and harelip, a defect that was to recur several times in future Holliday generations. His uncle was Dr Henry Holliday, a respected physician and his wife's cousin was Crawford Williamson Long. Long was the first surgeon to use ether as an anaesthetic in 1842 but unfortunately did not publish his findings until 1849. When John Henry was eight weeks old Drs Holliday and Crawford Long corrected the defects successfully although several years of speech therapy followed. Nevertheless, he was left with a slight speech impediment and some scarring of his lip, a blemish which would be well concealed in future years by his moustache.

Holliday was ten years old when the American Civil War broke out in April 1861. His family, staunch supporters of the Confederate cause suffered considerable hardship as a result of the defeat of the Southern States, nevertheless, money was found to pay his $5 matriculation and tuition fees of $100 to allow him to commence his dental training on Monday 3 October 1870 at the Pennsylvania College of Dental Surgery in Philadelphia. The course started with a five month period of instruction consisting of a two hour lecture and demonstration in the morning and another similar programme in the afternoon. His course work included chemistry, mechanical dentistry and metallurgy, dental pathology, therapeutics, dental histology and operative dentistry, physiology, microscopic anatomy plus anatomy and surgery.

On Saturdays, Holliday took part in clinical work, assisted by demonstrators in the college's 2,000 square feet operating room containing 28 chairs. Students were expected to provide their own instruments and "keep

them in perfect order." Candidates for graduation had to be twenty-one years of age and have studied under a private preceptor (qualified dental supervisor) at least two years, including his course of instruction at the college. Attendances on two full courses of lectures in the institution were required but satisfactory evidence of having attended one full course in "any respectable dental or medical school" would be considered equivalent to the first course of lectures in the college.

Satisfactory evidence of having been in practice for five years inclusive of the term of pupilage would be considered equivalent to the first course of lectures. During his first year, Holliday attended to about 39 patients, completed 32 fillings and extracted 38 teeth. Among the many operations with which he is credited was the construction and fitting of a bridge and making a swaged gold crown for a six-year old girl. This crown was reputed to have lasted throughout the patient's life until she died in 1967 at the age of 102. In March 1871, Holliday returned to his home town, now renamed Valdosta, and as required by the College, undertook clinical work, for a period of eight months, under the supervision of his preceptor, Dr Lucian Frederick Frink, who was a friend of his father. Holliday worked with Dr Frink until October of 1871 returning to college to resume his studies on November 6 for an additional 22 weeks of instruction and the preparation of a thesis entitled *Diseases of the Teeth.*

His final presentation was the provision of all necessary treatment for a patient and the construction and fitting of an artificial denture, presenting the patient before his professor of mechanical dentistry. Having satisfied the requirements of the College he graduated on Friday 1 March 1872 with the degree of DDS. The total length of the course was approximately 17 months. For its time this was a fairly comprehensive training for dentistry and young Holliday seems to have been a bright and skilful student.

After graduating John Henry moved to Atlanta and in July 26 1872 was in practice with Dr Arthur C Ford. It was soon after Christmas 1872 that the newly qualified dentist began losing weight and developed a nagging cough and six months later in the summer of 1873 discovered that he had contracted pulmonary tuberculosis, a disease which had presumably killed his mother, Alice. He was advised to adopt a regime which included a climate of warm, dry air, a nutritious diet and prolonged rest, so it was decided that he should seek warmer climes and in the third week of September 1873, he arrived in Dallas. At this time he became a prominent member of a temperance organisation, ironic in view of his subsequent history. Along with his partner Dr Seegar, they entered for an Annual Fair winning three premium prizes and five dollars for each of their displays; the best set of teeth in gold, the best in vulcanite and the best set of dentures.

By the end of the year Dallas's rapid expansion as a railroad city came to an end due to a decision not to extend the railroad out of Dallas, resulting in a decline in the growth of the population. Allied to his ailment John Henry found it increasingly difficult to maintain a successful practice. Consequently he found that he had a considerable amount of leisure time and it was not long before he discovered the St Charles saloon on Main Street with its gaming tables. He was also a regular at the Alhambra saloon and Johnny Thompson's Varieties Bella Union, headquarters for the majority of Dallas's gamblers, who welcomed the newcomer with open arms. They were not aware that the young dentist had been well schooled by the Holliday's Negro slave, Sophie in the finer points of "skinning" a gambling game very popular among the slaves and similar to faro at which he had become skilled. With his mathematical ability, he soon discovered his prowess as a gambler, poker and faro player and before long was able to provide himself with a good supplemental income and rapidly developed a reputation as a respected gambler in town. He was fast becoming a professional gambler, "a man who made money by talent and wit from the greed of others," - he was also starting to drink heavily. Bat Masterson, City marshal of Dodge City was reported as saying that, gambling was not only the principal and best paying industry in Dallas but was also the most respectable, "even more so than dentistry or medicine."

In March 1874, the partnership with Dr Seegar was dissolved and John Henry set up on his own, but gambling and drinking became his main occupation and inevitably he appeared before the local court following one of the periodic sweeps of Dallas's gambling dens. Soon after this he sold up his practice and moved to Denison, Texas, described as the lowest of the low with respect to bawdy houses, variety shows and gambling joints. Although residing in Denison, he made frequent trips to Dallas to visit old friends and gamble. He was in Dallas to bring in the New Year and was involved in a fracas with a saloon keeper called Charlie (Champagne) Austin. The local newspaper reported the event thus:

" Dr Holliday and Mr [Charles W] Austin, a saloon keeper relieved the monotony of the noise of fire-crackers by taking a couple of shots at each other yesterday afternoon.

The cheerful note of the peaceful six shooter is heard once more among us. Both shooters were arrested."

Later he was charged with assault to murder but was found not guilty. Doc left Denison on the El Paso stage heading for Denver but stopped off in Fort Griffin, a town with two thousand transient hunters and cowboys. Their presence and their money attracted drifters, gamblers and the ubiquitous prostitutes. The settlement had the reputation of being the wildest community on the Texas frontier.

Once again John Henry found himself in a scrape with the law having been charged with "gambling in a house selling spirituous liquors." Anxious to avoid further trouble he moved on without clearing up this minor matter. His life style in the past couple of years had not been conducive to recuperation and he still had his tubercular cough. In the summer of 1875, he arrived in Denver using his uncle's name of Tom Mackey and was soon working as a dealer at the faro table in the *Theatre Comique.* The theatre featured vaudeville acts and a saloon as well as gaming tables. Shortly after his arrival the news spread of a gold strike in the Black Hills in Dakota and soon Denver was emptied as the stampede to Cheyenne gathered momentum; the town was the point of departure for the gold fields, resulting in the opening of myriads of saloons and gambling halls. Gamblers and miners poured in from the fading mining towns to a growing, bustling new centre.

The news prompted the Doc to head for the new Mecca of gambling, but soon moved on with the recognised gambling circuit to Deadwood where he spent the winter of 1876-77.

After a series of confrontations with old adversaries whom he had antagonised at the gaming tables, Doc was involved in a shooting incident in Dallas with gambler Henry Kahn. Both men were arrested and fined but later that day they met again and renewed their quarrel. Kahn became violent and fired at Doc wounding him. The *Dallas Weekly Herald* of 7 July, 1877 carried the story that the Doc had been killed in a gun battle, a report which alarmed his family until it was proved to be untrue. Although the wound had been serious it had not proved fatal, and after convalescence he moved on to Fort Griffin.

Not uncommon in the West, John M Larn, Sheriff of Fort Griffin had been described as an outlaw, a cow thief and a killer. Along with his unofficial deputy, he had co-operated with a band of vigilantes. Their manner of cleaning up the countryside was by short-cutting the law process with numerous "necktie parties" - hangings. Eventually the Sheriff and his henchmen became leaders of the vigilantes while stealing cattle and horses on the side. Later in 1877, Larn resigned as Sheriff to take up duties as a cattle inspector for the Army and full-time cattle rustler. The cattle men took over the functions of the vigilantes and wearing white sheets speeded up the lynchings. Naturally in this climate Doc kept a low profile.

Kate Elder known as "Big Nose," came into his life in Fort Griffin where she had arrived after a somewhat dissolute and nefarious life style although only twenty six years old. At sixteen she had stowed away on a Mississippi river boat travelling to St Louis where she was befriended by one Silas Melvin and probably shared his home and his bed. Kate supported herself by assuming a life style which was in direct contrast to her Catholic upbringing. Before meeting the Doc she had been arrested and fined for working in a "sporting house" run by Mrs (James) Earp in Wichita. She came to Fort Griffin via Dodge City where she had worked in a dance hall. They soon established a rapport, living together for the remainder of the Doc's life. There is no evidence that they were ever married.

Around this time, according to Kate, Doc was still practising dentistry from a hotel room in Fort Griffin, but gambling was still his foremost activity and it was while playing poker with a local resident Ed Bailey, that an argument ensued when Bailey was caught examining the pack of discards, an illegal action. According to Doc, Bailley was about to pull a gun on him so he got in first, pulled out his knife and caught him in the ribs. Unsure of Doc's claim of self-defence the town marshal placed him under house arrest in his room at the Planter's Hotel. Meanwhile a mob of vigilantes had formed outside and fuelled with drink were clamouring for his blood. Kate recognised the danger and set fire to a nearby shed as a diversion and while the crowd busied themselves putting out the fire, she brought a horse round to the back of the building and then, pulling out a six shooter on the surprised marshal, freed Doc and escaped to spend the night hiding in the outskirts of the town.

Early in 1878 the pair made their way to Dodge City, where 250,000 head of cattle were arriving, accompanied by over a thousand Texan cowboys eager to spend their accumulating wages on wine, women and gambling. Having established themselves, Doc once again prepared to practise dentistry, apparently the town was very much in need of his services. He practised during the day from Dodge House, which also held dances and had gained local notoriety as a gambling den. Doc also frequented many gaming houses and it was in one of these that he met Ed, Bat and Jim Masterton. Ed had been City Marshal, but was gunned down in November of 1878. Shortly after this murder, Wyatt and Mattie Earp arrived in town. The former was appointed Deputy to the new Sheriff.

Because of the poor wages which law men received they frequently took jobs in the gaming houses and they were often seen in association with the Doc welcoming the cowboys just off the trail, ready to help them empty their well filled pockets at the gaming tables. He seemed to avoid any scrapes with the law during this period, in fact his close association with the law officers was commented on by a trail cowboy from Texas who said that the Doc was one of a roster of peace officials in Dodge City along with Ed, Jim and Bat Masterton and Wyatt Earp. In the summer of 1878, the *Dodge City Times* carried the following announcement:

DENTISTRY. *J H Holliday, Dentist, very respectfully offers his professional services to the citizens of Dodge City and surrounding country during the summer. Office at Room No.24, Dodge House. Where satisfaction is not given money will be refunded.*

It was in Dodge that Doc saved Wyatt Earp's life when surrounded by a band of desperadoes, one of them pulled a gun on the Marshall behind his back. According to Wyatt's own words, the Doc yelled "Look out Wyatt!" and simultaneously drew his gun and shot the intended assassin before the latter could fire.

In the fall of 1878, John Henry's health began to deteriorate and he and Kate, travelling as Dr and Mrs John H Holliday, arrived in Las Vegas, where the Doc once again opened a dental practice. Business proved slow as the region was experiencing its coldest winter for years and to add to his troubles the Legislature passed a law prohibiting gambling. As a result of his activities, Doc found himself before the County Court Judge on a charge of keeping a gaming table and was fined $25. As a consequence of the unseasonable weather, his condition had not improved, neither had his dental practice; the new anti-gambling law was also making life difficult so once again he was on the move, back to Dodge City.

No sooner had he arrived than he joined a well-armed posse to take part in the "Railway Wars" between two rival companies, the Atchison, Topeka and Santa Fe and the Denver and Rio Grande for the right to run the expanding railway into Las Vegas. Ownership of the land was resolved by peaceful means, much to the disappointment of the participants who had expected a good fight. When the tracks did reach the town the citizens were astonished to find that the town had been bypassed by one mile. As a result, a town of tents and hastily thrown up buildings was erected along side the railway by the hungry newcomers anxious to cash in on this new commercial centre. It was named East Las Vegas and was soon crowded with eating houses, saloons and gambling dens. Naturally the women of easy virtue were also in attendance to cater for all the needs of the newcomers. Street brawls and killings were common and generally averaged about one a month. The town was booming and Doc set himself up in the Holliday Saloon – a gambling joint along with a partner, Jordan J Webb. He was soon in trouble once more facing charges of 'keeping a gaming table' and a second charge of carrying a deadly weapon.

In 1879, Wyatt Earp arrived in Las Vegas and persuaded Doc and Kate, who had now rejoined him to come with him to Tombstone, Arizona, where there had been a new strike; the new boom town beckoned, but while still in Vegas he met up with an old antagonist, Charlie White whom the Doc had thrown out of a gaming salon for cheating when he had been dealing. On seeing Doc he drew his gun and fired, missing his target, but just as quickly Doc returned the fire and dropped his assailant. He thought he had killed him but luckily the bullet had only grazed him. After that incident, Doc left Las Vegas and headed for Tombstone, Arizona, this time without Kate and was soon investing in several business ventures with the Earp brothers. But it was not long before he was involved in another shooting which resulted in his appearance before Justice James Reilly on a charge of assault with a deadly weapon with intent to kill.

As none of the prosecution witnesses appeared this charge was dismissed and Doc pleaded guilty to the lesser charge of assault and battery and was fined $20. His victim, who had initiated the attack, escaped with a severe gunshot wound to his hand. On the night of March 15, 1881, the Arizona Mail stage coach carrying eighty thousand dollars in silver bullion, was held up. Eli "Bud" Philpot who was riding shotgun and a passenger were killed, the driver was able to thwart the robbery with his return fire and regained control of the team of horses which had bolted when the firing started. As a friend of Doc's was named in the hold-up, a rumour soon swept the town that he was also implicated. One of the robbers, Luther King, who had confessed to his part in the robbery, was held in custody and it became clear that in order to clear Holliday's name, the rest of the gang named by King would have to be caught. The latter under the less than watchful eye of the Under Sheriff, (a crony of Sheriff Behan, about whom more later) was also editor of the *Tombstone Nugget.*

In an article he stated that the escaped prisoner was an important witness against Doc Holliday and that

the escape was a well planned job by outsiders. A follow-up item in the *Arizona Weekly Star* reported that a well-known personality alleged to be Holliday was in Tombstone and had been shadowed ever since his return from an out of town visit at the time of the robbery. It was evident that Sheriff Behan and his allies were trying to implicate Holliday in the double killing as a diversionary tactic to draw attention away from themselves. They had close associations with the criminal elements and in addition were also influenced by enemies of Doc and the Earps. Behan was also jealous of the attentions being paid by his girl friend towards Wyatt Earp. Charges brought by Behan were dismissed but things looked black for Holliday when Kate, in a drunken state engineered by Behan signed an affidavit stating that Doc had admitted to her that he had committed the stage coach murders. Doc was arrested by Behan on a murder charge but subsequently, Kate who had regretted her actions, no doubt as a result of a quarrel with Doc, repudiated her statement and the charge was dismissed. Meanwhile two of the gangsters named in the hold-up were killed in a gun battle leaving one, Jim Crane able to clear Doc's name.

In a subsequent encounter, Holliday was involved in a gun battle with Crane's gang in which the latter was killed, ending Doc's hopes of proving his innocence in the stage-coach murders. Warren Earp was wounded in the fight as was Doc Holliday who was hit in the leg and walked with a stick for some time afterwards. There are many versions of the gunfight at the OK Corral, mostly exaggerated, but the account compiled by Karen Holliday Tanner would appear to be nearest to the truth. A short account of the background and the politics of Arizona illustrates some of the causes of the deep seated enmity towards Doc Holliday and the Earps.

The Clanton Gang, Ike Clanton and his brother Billy; Thomas and Frank McLowry (collectively known as "the cowboys") were the antagonists in the gunfight with Wyatt Earp, his brothers, Virgil and Morgan and Doc Holliday. Wyatt had been a Deputy United States Marshall, but resigned that position prior to the shooting. His brother Virgil was Town Marshall of Tombstone. There had been a long-standing hostility and numerous threats from the Clantons to kill Doc Holliday and also the Earps, who continuously frustrated their unlawful activities. A word about John Behan, Sheriff of Tombstone, who played a crucial part in the shoot-out. Behan, who was part of the Democrat machine had a finger in every crooked deal and in league with rustlers, hijackers, murderers and outlaws. He and Wyatt became enemies after Behan reneged on promises to make him his deputy. Instead he appointed Frank Stillwell, the region's champion stage robber. In these days the Sheriff was nourished on fees and patronage and was also the tax collector and even got a cut from property transactions as well as from about everything else that went on - the potential "take" was big.

It was a well-known fact that Behan and his deputies protected the rustlers from the consequences of their law-breaking. Their friendly co-operation included tipping off the rustlers that the "heat" was on, seeing to it that they were "heeled" (armed) after they had been dis-armed and even springing them from jail once they had been arrested.

One of Behan's deputies was the publisher of the *Tombstone Nugget*, the newspaper of the county political ring and the defender of the rustlers and all their works. Tombstone's protection racket was politically directed - running directly from the capital down through an efficient and dependable county organisation, to an outlaw band that operated across the Mexican border. Unfortunately for this organisation, the Earp brothers, controlling Tombstone, frustrated the law-breakers at every turn, and thus became their enemies. As an adopted member of the Earp's family, Doc Holliday also became involved. The O.K. Corral was a livery stable with open pens for horses. On two sides were buildings, one, the studio of Arizona's pioneer photographer. C.S. Fly, who also owned a boarding house and on the other a mineral assayer's office. It was against the wall of the latter that the Clantons, the McLowrys and Billy Claiborne, another rustler and killer took their stand on Wednesday 28 October 1881.

Doc Holliday, Virgil, Wyatt and Morgan Earp met at Hafford's Corner saloon at the junction of Forth and Allen Streets in Tombstone. According to an eye-witness they were an imposing group, all around six feet tall and attired in dark suits and coats. Reuben Coleman, a local miner, approached the group with the news that he had just seen Ike and Billy Clanton with Frank and Tom McLaury at the O.K. Corral. They were armed and obviously looking for trouble. Coleman made a suggestion to Sheriff Behan, apparently ignored, that he should disarm the troublesome group before anyone got hurt, and made the same suggestion to Marshal Virgil Earp. Virgil, in an apparent effort to convey an air of authority, borrowed Doc's cane and Doc carried Virgil's shotgun. The marshal accompanied by his brothers and Doc who had all been appointed deputies, moved to disarm the Clantons and the McLaurys knowing full well that they would not give up their arms peacefully. As they turned into Fremont Street they saw that their quarry had been joined by Billy Claiborne, the quintet were apparently waiting outside a boarding house run by Fly, where the Doc had been staying.

Unaware that he had already left, they were hoping to catch him by surprise as he emerged. Marshal Virgil Earp called out to the gang, "Throw up your hands." Immediately, two shots were heard. It is not known for certain who fired the first shot but it was most probably Wyatt Earp, hitting Frank McLaury in the stomach. During the next twenty to thirty seconds, as the shooting became general, Billy Clanton was struck by several bullets and at this point Doc fired his shotgun hitting Tom McLaury who staggered several yards down Fremont Street and fell dead. Morgan Earp was hit in the right shoulder while his brother Virgil was wounded in the leg. At this point, Doc threw away the shotgun and started firing with his pistol at the wounded Frank McLaury only about twelve feet in front of him. Doc was hit in the holster and Virgil Earp and McLaury fell whilst Frank McLaury was in his final death throes dying from wounds in the head and abdomen. Within minutes the shooting ended, the McLaury brothers and Billy Clanton were dead. Ike Clanton and Billy Claiborne had escaped death when they fled. Doc discovered a red streak across his hip where Frank McLaury's bullet had grazed him.

At a coroner's inquest held three days later on October 29th, John Henry Holliday and the three Earp brothers were charged with the killings of Billy Clanton, Tom and Frank McLaury. Virgil and Morgan Earp, due to their wounds were not in court. Wyatt and Doc were arrested by Sheriff Behan, but released on bail. Will McLaury, the dead men's brother and an attorney by profession, arrived from Texas and was able to force the judge to re-incarcerate them without bail leading to their re-arrest. On November 4th they were freed on a writ of Habeas Corpus. Wyatt and his allies were now the defendants and were forced to show why they should not be indicted for deliberate and unprovoked murder. The local paper the *Nugget*, controlled by Sheriff Behan's cohorts, churned out its propaganda and pressed the charges with considerable inaccuracies, but dwelt on the charge that there had been a mis-use of police power for private ends.

Subsequently, after a series of court hearings, adjournments and legal actions, Wyatt and Doc were cleared and later a Grand Jury took the same view. Following the trial and acquittal, Morgan Earp was shot in the back while playing billiards. His brother Wyatt vowed to avenge his death and the killers were subsequently identified and one by one were hunted down and killed. Although there were strong suspicions that the Earps and Doc Holliday were the assassins no evidence was ever produced to charge them. Tombstone was now no place for either the Earps or Doc Holliday – they had created too many enemies in the wake of their trail of vengeance and in July 1882, they travelled to Pueblo arriving about 7 May. There, Doc was taken by surprise by Perry Mallan, who claimed to be a Los Angeles law officer. He arrested Holliday and escorted him to the local jail and told him that he was charged with the murder of Frank Stillwell, one of the gang involved in the killing of Morgan Earp. It transpired that Mallan was an impostor employed by the crooked sheriff Behan who wanted Holliday back in Arizona territory.

After a series of further court appearances he was released only to be re-arrested on a further warrant from a sheriff acting under instruction from his old enemy, Behan. Once again he was bailed and released, but failed to appear in court to defend the charge. Doc knew that he was not free of enemies from his Tombstone days and soon learned that several enemies from Tombstone were also in town determined to avenge the humiliation they had suffered at his hands when they were evicted from the Oriental Saloon in Tombstone by Wyatt Earp.

They taunted Holliday on several occasions, challenging him to pull his gun but Doc, determined to stay within the law, announced that he did not have one and refused to be involved. However, Holliday could not avoid Billy Allen, who was in town with a gun looking for him, Unfortunately, he owed Allen five dollars. Allen threatened violence if he did not pay up and when Doc spotted Allen with his hand in his pocket he assumed he was about to produce a gun. Doc fired, but luckily for Allen the bullet hit him in the arm and Doc's second shot missed his opponent by inches. At that point Doc was pulled away before he could fire again. Holliday was arrested and charged with assault with intent to murder, but after a number of court appearances he was found not guilty.

After visits to Denver, Silverton and back again to Denver, Doc was finally persuaded to travel to Glenwood, noted for its sulphur springs in the hope that the water would improve his condition. Here he was nursed by Kate who had responded to a call to join him. Even in his rapidly deteriorating condition he attempted to do some dental work but his violent bouts of coughing made that impossible. For a time he reverted to dealing at faro in several of the gambling joints. The sulphur springs worsened his condition and he became bedridden and in the third week of October 1887 he became delirious and died at the Hotel Glenwood, Glenwood Springs, Colorado on 8th November 1887, at the age of 36.

Doc Holliday, a highly skilled dentist, became known as one of the most skilful gamblers and the speediest, deadliest man with a six shooter in the Wild West. Unfortunately it was this expertise with cards and gun and not his dental skills and dexterity that he will be remembered for.

Notes

1) Quotations are taken from Karen Holliday Tanner, *Doc Holliday, A Family Portrait*, University of Oklahoma Press 1998
2) A useful website is www.jhholliday.com

DUFF HOUSE AND THE TREATMENT OF DIABETES

The noble edifice of Duff House on the outskirts of the Royal Burgh of Banff will be familiar to many, but its history is known to few. It is certainly little known that from 1913 to 1923 it was a private nursing home offering special expertise and facilities for the dietary treatment of diabetes. Duff House was commissioned by William Duff of Braco, later the 1st Earl of Fife, and designed by William Adam, mason to the King in Scotland, and father of the brothers Adam who became distinguished architects.

Building started in 1735 but was not completed until 1746, and two wings which appeared in the original design were not then built. William Duff himself never occupied the house, having had a lengthy dispute with the builders after its completion, but Lord Macduff, who succeeded his father as the 2nd Earl in 1763, made a determined effort to finish the house. He furnished it lavishly and it served the succeeding Earls of Fife as an administrative and social centre for their vast landed estates (Tait, 1985). The three-storied oblong building, with its rich architectural decoration, stands in well wooded grounds of 165 acres on the west bank of the river Deveron. A west wing of plainer design was added in 1871, and a private golf course, now Duff House Royal Golf Club was laid out in 1909 by a Mr S Munro Ferguson and Archie Simpson, the professional at Balgownie, and opened by a match between JH Taylor and James Braid, two of the great Scottish golfing triumvirate (Mahood, 1919).

The house was the home of the successive Earls of Fife until 1903, and in 1906, the 6th Earl, later Duke of Fife, and his wife the Princess Royal, presented the house and grounds to the Burghs of Banff and Macduff. A long lease on the house and grounds was then obtained by a Dr David Lawson (1868- 1952), who, with the help of friends and relatives, formed a company to finance a private nursing home, and after extensive alterations and equipping, this opened in September 1913. Dr Lawson was a graduate of St Andrews and Edinburgh, and after a short spell in general practice, had become interested in the treatment of pulmonary tuberculosis. He was impressed with the lack of special sanatoria facilities in this country compared with those on the continent, and in consequence, opened the first institution of its kind at Banchory as Nordrach-on-Dee (now Glen O'Dee), modelled on a famous sanatorium Nordrach at Baden, in Germany. This proved highly successful and convinced him of the value of X-rays and skilled laboratory investigations as adjuncts to clinical investigation and led to his decision to set up an institution where such facilities, which were beginning to appear in the more progressive teaching hospitals, would be available to the nursing-home class of patient. Dr Lawson himself was not to be directly involved in practice at Duff House, but continued as director of his sanatorium, and also of the related Tor-na-Dee, which was built just after the Great War, when both were taken over by the Scottish Red Cross. He was later for a period chairman of the Foresterhill Hospital scheme and remained active in retirement living at Banchory, until his death in 1952, aged 84 (David Lawson, Obituary, 1952).

At the opening of Duff House in 1913, Dr Lawson was fortunate in securing as the first physician in charge Dr (later Sir) Edmund Ivens Spriggs (1871-1949). He was to have a crucial influence on the reputation and interest of the institution. An honours graduate of Guys Hospital, he had begun a successful academic career at St George's Hospital, where he was senior assistant physician and lecturer in Pharmacology and Dean of the Medical School. He was a member of both the Physiological and Biochemical Societies, and had shown an early interest in diabetes and dietetics by contributing sections on both subjects to a contemporary textbook (Medical Directory, 1914). In 1911 he developed a tuberculous pleural effusion and had spent a year at Nordrach-on-Dee Sanatorium, and it was there that he met Dr Lawson, and after his recovery, having been advised not to return to London, he accepted the post of senior physician at Duff House (Edmund Ivens Spriggs, Obituary, 1949).

The institution specialised in the proper investigation and treatment of disorders of nutrition, and was equipped with advanced X-ray installations and chemical laboratories with highly qualified staff. They also offered special interest in patients suffering from diabetes. Prior to the discovery of insulin in 1922 by Banting, Best, Collip and Macleod in Professor Macleod's laboratory in Toronto, diabetes mellitus, at least in its more severe forms, was a uniformly fatal disorder. Dietary treatment was the only approach then available. Older patients, most of whom we now recognise as having Type 2 diabetes would respond, but for younger sufferers with insulin-dependent (Type 1) diabetes, the inevitable end was only postponed.

Dr Frederick Allen, a stern figure in American diabetology, working in New York, had introduced a starvation treatment regime (Allen, 1915). With profound reduction of carbohydrate intake, the amount of glycosuria and the patient's symptoms would be reduced, the unfortunate sufferer being maintained in a state of weakened malnutrition before succumbing in terminal coma, or from complicating infection which was commonplace. Because of this absence of specific treatment, few hospitals in this country at this time offered special facilities, or took particular interest in diabetic patients. Dr Spriggs and the staff at Duff House were, however, to gain considerable expertise in this field. He quickly gained experience in the role of fasting treatment in diabetes and reported his findings in eight patients of varying severity at The Royal Society of Medicine in 1916 (Spriggs, 1916a) and published this work in the British Medical Journal the same year (Spriggs, 1916b). The patients ranged in age from 24 to 79 years, and the five youngest had what we would now recognise as Type 1 diabetes, giving a relatively short history of symptoms, and being underweight, and showing ketonuria. Fasting was continued in bed until the urine was made free from sugar, the blood sugar reduced, and acidosis, if present, greatly diminished. This often took several days. Initially only tea with a small quantity of cream twice daily was given, supplemented later by 150 cc clear meat broth at lunch and dinner-time. If acidosis was present after two days of fasting, a small quantity of alcohol was allowed! When the urine had been sugar-free for 24 hours, 7.5 g of carbohydrate in the form of vegetables was added, and the diet thereafter increased by 5 g carbohydrate amounts on alternate days until sugar reappeared to define the limit of tolerance. Protein and fat intake were thereafter cautiously increased until the patient stopped losing weight. Accurate diet lists and close supervision were required to achieve these objectives, and although in the initial phases the patients were significantly undernourished, they were freed from distressing symptoms and were able to maintain benefit over significant periods.

Blood sugar estimations were widely used in assessment, in addition to daily quantities of tests on urine for sugar, acetoacetic acid and acetone. Blood sugar levels in all diabetic patients were estimated at least twice daily, on blood obtained from finger puncture. By 1920, a colleague was able to give a detailed report on their findings on 50 patients admitted since 1913 (Pickering, 1920). They also had skilled dietetic help, and produced what must have been one of the first teaching books for diabetics, 'The Patient's Manual of Diabetes' which was given to all suitable patients at Duff House (Spriggs, 1923). Consisting of 20 chapters, extending to 80 pages, after an introductory chapter, there were sections on weights and measures, and on the collection, measurement and testing of urine, before chapters covering the dietary aspects in considerable detail. It is of interest that at this early stage Dr Spriggs was recommending a 10 g carbohydrate exchange, whereas a 15 g exchange was later widely used elsewhere, especially in Scotland, until the 1960s when the British Diabetic Association recommended the adoption of the 10 g exchange now in universal use.

There was also a long chapter on 'Diabetic Cooking' by the diet sister, and unusually, an 11 page chapter on 'Special Gardening' by John A Grigor, the head gardener, emphasising those points which had been found most useful in securing a good supply of greens, salads and other vegetables, special attention being given to those which could be grown in the winter and spring months. Twenty-eight separate vegetables, from artichokes to vegetable marrows, were discussed, with mention of the varieties available which had been found most successful.

Duff House, in the pre-insulin era, was clearly able to offer very advanced facilities for the dietary treatment and management of diabetes, and attracted patients from all over the country. It was then the only private hospital in the UK specialising in diabetes and few teaching hospitals at this time could offer comparable interest and facilities. In addition to his medical work, Dr Spriggs made many contributions to local affairs. In 1919, he edited a local guide book on Banff and District (Mahood, 1919), and in 1922 was elected a JP for Banffshire. He was also an examiner in Medicine at Aberdeen University.

The management of diabetes was revolutionised by the discovery of insulin in Toronto in 1921-22. The first publication of the striking beneficial effect of '*Pancreatic Extracts in the Treatment of Diabetes*' was in the March 1922 issue of the Canadian Medical Association Journal (Bunting et al, 1922a), while the first official declaration of the new discovery, and use of the word insulin, was given by Professor Macleod in May the same year, at the meeting of the Association of American Physicians in Washington (Banting et al, 1922b). These reports attracted little attention in the United Kingdom, and it was not until 4 November 1922 that Professor Macleod published an authoritative article on the subject in the British Medical Journal (Macleod, 1922). Three days after this appeared, Dr Spriggs wrote to Professor Macleod enquiring about the possibility of obtaining supplies of insulin. This letter, and a copy of Professor Macleod's reply of 22 November, indicating that control of the production of insulin in the British Isles had been turned over to the Medical Research Council, remain in the University of Toronto archives, where they were seen by the author during a visit in March 1991 in the course of research on Professor Macleod's life. Dr Spriggs indicated that he had

visited Toronto and met Macleod a year or two before, and in his reply, Macleod mentions that he was aware of the high standing of Duff House as a sanatorium for the management of diabetic patients (Macleod papers).

The MRC had accepted Macleod's offer, made in June 1922, for the British patent rights to insulin manufacture, but were cautious in their approach, and production and testing did not start until early 1923. The first patients treated were at Sheffield and St Bartholomew's Hospital in London, in February 1923, and in Glasgow in March 1923 (Swan, 1991). A doctor diabetic in Edinburgh had, however, received insulin in August 1922, the insulin having been brought back by a doctor friend from Toronto (Lyon, 1990). Dr Spriggs treated his first patient with insulin on 21 April 1923. The patient was aged 47 and diabetes had been diagnosed eight years earlier when he was an officer in a Highland regiment. He had first been admitted to Duff House in March 1915, and had initially been maintained on dietary treatment, but since 1921 his tolerance had deteriorated, and by 1923 he was markedly underweight and weak The insulin used was initially prepared in the hospital laboratory, and then supplied by the British Drug Houses through the MRC. The patient was started on just 3 units of insulin thrice daily, and the blood sugar measured hourly from 8.00 am to 9.00 pm on the first five days. The dose was then steadily increased, and eventually changed to twice daily injections, the patient eventually being stabilised on 20 units before breakfast and 10 units before tea with a diet of 2500 calories, but still low in carbohydrate. He showed an excellent response, gaining eight pounds in six weeks with clearance of acidosis, and control of the excess sugar in the blood and urine (Spriggs et al, 1923).

This patient did not, however, receive his insulin at Duff House, as in early April the institution there had closed and with the staff moved to Ruthin Castle in North Wales. There were several reasons for the move. A request for planning permission for extensions had been refused. Dr Spriggs was also anxious to leave the area on personal grounds, his two adolescent daughters having shortly before been tragically drowned in a bathing accident (Spriggs, 1992). Ruthin Castle advertised special expertise in the introduction of insulin in diabetics, but with the development of diabetic and dietetic facilities in most hospitals, there was less call for their services, and in his years at Ruthin Castle, Dr Spriggs turned his attention more to the investigation and management of gastrointestinal diseases. He was made KCVO in 1935 and retired from active medical work in 1945 but was further honoured by being president of the British Society of Gastro-enterologists in 1948. He died in 1949.

Duff House itself, after the hospital's departure, functioned for a few years as a private hotel, but from 1928, lay abandoned and empty, until requisitioned by the War Office in 1939. It was initially used to accommodate POW German merchant navy officers, and during this period, several of the unfortunate prisoners were killed when a stray bomb badly damaged the west wing. It was later used as a billet for overseas and Scottish troops, (Tait, 1985). In the postwar period it again lay derelict until acquired by the Ministry of Works in 1956 and is now held in trust by the Secretary of State for Scotland. It is currently being renovated and refurbished, and is to be opened shortly as a museum and portrait gallery as a joint venture between the Banff, Gordon and Aberdeen District Councils. Over the 246 years of its existence, Duff House has served various functions. During its 10 years as a nursing home, it made notable contributions to the management of diabetes, and deserves to be remembered in the local history of diabetes care.

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The Scottish Society of the History of Medicine

REPORT OF PROCEEDINGS
SESSION 2003-2004

THE FIFTY FIFTH ANNUAL GENERAL MEETING

The Fifty Fifth Annual General Meeting was held on 1 November 2003 at the Health Service Centre, at the Western General Hospital, Edinburgh. The President, Dr David Wright, was in the chair and 41 members attended. The minutes of the 54th AGM were approved and the Secretary's and Treasurer's reports were accepted. Mr John Blair was presented with honorary Life Membership of the Society. Dr Tony Butler was elected as Honorary Secretary for a further period of three years. Three members of Council, (Mrs Mary Haggard, Mr John Chalmers and Dr Jim Gray), retired after serving for three years and they were thanked for their efforts. They were succeeded by Mr Roy Miller and Dr Morrice McCrae.

THE ONE HUNDRED AND SIXTY SEVENTH ORDINARY MEETING

This meeting followed the Fifty Fifth Annual General Meeting at the Health Service Centre, at the Western General Hospital, Edinburgh. The President introduced two speakers, Professor Anthony Seaton, who talked on the History of Occupational Lung Disease and Dr Tony Butler, whose title was Lyon Playfair and Edward Jenner: a St Andrews Story.

LYON PLAYFAIR AND EDWARD JENNER: A ST ANDREWS STORY.

The Playfair family were associated with St Andrews over several generations and contributed significantly to the revitalisation of the city in the 19th century. The association started in 1800 when the Rev James Playfair, minister of Meigle Parish in Perthshire, was invited to become the Principal of the United Colleges of St Leonard and St Salvator and minister of St Leonard's Church. He had more than once turned down the offer of the Moderatorship of the General Assembly, for reasons that are not clear, but found the St Andrews offer too attractive to reject. The United College was very rundown at the time but improved during his leadership. The town was equally derelict with a population of under 3000, dirty streets and 48 ale houses. James Playfair had four sons, three of whom (George, Hugh Lyon and James) figure in this narrative. Hugh Lyon Playfair, after service in India, returned to St Andrews and eventually became provost, doing much to modernise the town. He also was a prominent member of the Royal and Ancient Golf Club. James became a merchant in Glasgow. George qualified as a doctor and worked in India, eventually becoming supervisor of hospitals in Bengal. He married Janet Ross and one of their sons, born in 1818, was christened Lyon. Hugh Lyon Playfair and Lyon Playfair are occasionally confused (they were uncle and nephew) but their careers were dramatically different. The life of Hugh Lyon Playfair has been frequently chronicled but that of his nephew is less well-known.

Born in India, at the age of two he was brought to St Andrews and left with his uncle's family who engaged a nurse, Miss Douglas, to look after him. One of his favourite activities as a child, from which he learnt much, was to walk along the West Sands. He attended the local school but found it un-stimulating with a curriculum of little apart from Latin. At the age of 14 he enrolled as a student at St Andrews University, learning as much from the professors he met at home as from those who lectured to him. On leaving university he first tried a commercial career in the office of his uncle James in Glasgow but found it unbearably tedious and in 1835 enrolled as a medical student at the Andersonian College in Glasgow, where one of his fellow students was David Livingstone. While at the college he came under the influence of the lecturer in chemistry Thomas Graham and spent more time studying chemistry than other subjects in the medical curriculum. Graham moved to University College London and Playfair left Glasgow to continue his medical studies in a more conventional way at the University of Edinburgh. Unfortunately he had to discontinue his training as the vapours of the dissecting room and the hospital caused very severe eczema. Playfair wanted to return to science but his father, still in India, urged a commercial career and set him up in an a trading company in Calcutta but this again proved very tedious and he returned to London to work with Thomas Graham. Graham advised him that, to make progress in chemistry, he needed a German doctorate and so Playfair enrolled as a doctoral candidate in Justus Liebig's laboratory in Giessen to study the chemistry of myristic acid (from nutmeg) and carophyllene (a sesquiterpene from cloves). In 1840 he turned to Britain with the coveted doctorate, the goodwill of Liebig and an excellent command of German. His first task was the translation of Liebig's highly influential book on agricultural chemistry, a text that introduced a more scientific mode of farming. This brought the translator to the attention of members of the scientific establishment, many of whom were also landowners. His first proper job was as chemist at the famous Primrose calico works in Clitheroe but changing public taste resulted in the rapid closure of the works and Playfair was forced to take an unpaid job as lecturer at the ill-fated Royal Institution in Manchester, where John Dalton was frequently in the audience. In 1842 Liebig was a visitor to Britain and Playfair was his guide and companion, meeting many influential people in the political world.

Out of the blue came a letter from no lesser person than Michael Faraday asking him if he would like the chair of chemistry at the University of Toronto. When news of this reached the government there was an immediate response. The Prime Minister, Robert Peel, met Playfair and urged him not to accept the post but to stay in Britain. He was flattered enough to fall in line and returned to his unpaid post in Manchester. However, remunerative work soon came his way. The British Association asked the German chemist Robert Bunsen, of Bunsen burner fame, to examine the chemistry of the gases coming from blast furnaces and Bunsen asked Playfair to join him. It was during this task that Playfair met his first wife Margaret Oakes, the daughter of a Lancashire ironmaster. They married in 1846. In a very significant development Peel asked him to join the Royal Commission on the Health of Towns. He studied conditions in a number of Lancashire towns and was appalled at the overcrowding, filth and disease that characterised the lives of the working classes. This commission started his life-long interest in what he called 'sanitation' and what we call public health. Later this concern was to dominate his life, leading, in 1898, to the award of the Harben Gold Medal of the Royal Institute of Public Health.

To further his career he needed to be in London and a post was found for him at the Geological Survey. It was there he made his most significant chemical discovery: a group of salts called the nitroprussides. The name is unfortunate as there is no nitro group and they are not prussides. The correct chemical name is pentacyanonitrosylferrates and the sodium salt is marketed under the name Nipride as a vasodilator, used in vascular surgery and the management of myocardial infarction. It is a good vasodilator but the presence of the cyano groups makes the death of a patient by cyanide poisoning an ever present possibility.

He continued to serve in government commissions, including a study of the potato famine in Ireland and the lavatories in Buckingham Palace. Apparently they were primitive even by Victorian standards. The most important of his government posts came in 1850 when he was invited to be a Special Commissioner for the Great Exhibition at Hyde Park in a spectacular greenhouse designed, initially as a doodle on a blotter, by Joseph Paxton. In spite of an inauspicious start, the Exhibition was a great success and led to a life long friendship between Playfair and the Prince Consort and, unlike the Millennium Dome, a very considerable profit used to purchase the ground on which the Victoria and Albert Museum, the Albert Hall and Imperial College London were built.

In March 1852 he became secretary of the government's newly established Department of Science and Art and he used this post to promote his vision of a network of science schools. He met with little success and in 1858 he abandoned his government work and accepted the chair of chemistry at the University of Edinburgh. During his time in Edinburgh he did little scientific research, although he did supply James Young

Simpson with various materials to test as anaesthetics. Instead he played a large part in the administration of the university. He re-organised the teaching of chemistry and provided encouragement for his colleagues. He was president of the Chemical Society, now the Royal Society of Chemistry, 1857-59 but, by the late 1860s, chemistry played only a small part in his life and in 1868 he quit the chair to take up politics fulltime. After a vigorous campaign he was elected the member for the Universities of St Andrews and Edinburgh and took the Liberal whip. He spoke frequently in the House on education and public health. He introduced legislation which allowed 'postcards' to be sent in the mail for 1/2d and, in fact, later became Postmaster General in Gladstone's government. He represented this constituency for a total of 17 years. For a time he was Deputy Speaker without great success owing to the disruptive behaviour of some Irish members. He was knighted in 1883. He represented the constituency of Leeds South from 1885 to 1892 when he was raised to the peerage and took his seat in the House of Lords as the first Baron Playfair of St Andrews.

One issue that exercised him greatly was part of his concern for public health: legislation enforcing compulsory vaccination against smallpox. The consequences of contagious diseases upon the working classes were brought home to him forcibly during a number of Royal Commissions and smallpox was one of the most deadly of these diseases. It had been around in most of the world since earliest times but it was the growth of cities that made it a major problem of public health. Unlike cholera the means of controlling smallpox was known in the 19th century. The simple observation that few people contracted smallpox twice led to the practice of inoculation, or variolation as it was called in the case of smallpox. The healthy victim was given an attack of smallpox and, if he recovered, he would be free from smallpox for the rest of his life. It was a hazardous business as the victim might die or be scarred for life. The technique of variolation was perfected by the Chinese in the 18th century and passed to Arab physicians. Lady Mary Wortley Montagu witnessed variolation by Greek women in Constantinople when her husband was ambassador there and brought the therapy back to London where it was called engrafting. Lady Mary was very active in encouraging aristocratic mothers to have their children treated in this way but it had very limited use as a public health measure amongst the working classes. Edward Jenner's genius was to see a safer way of achieving the same end. He noticed that milkmaids, who nearly all suffered from a mild disease called cowpox, which they contracted from cows, rarely suffered from smallpox. He reasoned that whatever mechanism stopped people from getting a second attack of smallpox could be equally well activated by an attack of cowpox.

Edward Jenner was born in the Gloucester village of Berkeley in 1749, the son of a vicar. He nearly died on being variolated as a child. He was apprenticed to a local surgeon and also studied with John Hunter in London. He completed his qualifications with an MD from the University of St Andrews, hence the link between Playfair and Jenner, although there is no evidence that he ever visited the town. In 1796 Jenner found a milkmaid with cowpox lesions on her fingers and he used this material to infect a boy, James Phipps, who soon developed a slight fever, characteristic of cowpox. Later he inoculated the boy with smallpox matter but no disease developed. The effect was confirmed with experiments on orphans and convicts and vaccination was born. It was slow to be accepted but the practice grew during the 19th century and, with an increasing concern for public health, it was seen as a way of controlling epidemics. This meant compulsory vaccination and it was the compulsory nature that caused so much opposition. Societies sprang up to oppose compulsory vaccination as the government proposed legislation to enforce it. The opposition took two forms a) a criticism of the scientific evidence that vaccination was effective in preventing smallpox and b) an instinctive hostility to introducing into humans something from a diseased animal.

A number of prominent scientists, including the naturalist Alfred Russel Wallace, adopted the first position. Many of the reservations expressed we can now see were due to faulty practice but, at the time, the evidence was far from totally convincing. Also groups, some of which had been vaccinated and others not, were compared for their resistance to smallpox with puzzling and inconclusive results. But the groups were not carefully matched, as would be required in modern medical statistics, and no certain conclusions should have been drawn. The second objection was strongly supported by many clergymen. In Victorian times man was not seen as just another animal. Said the Psalmist, 'Thou hast made him a little lower than the angels and hast crowned him with glory and honour'. The Genesis creation story sets man apart from other animals and to introduce something from a diseased animal was to deny man's spiritual nature. Some people may choose vaccination but to make it compulsory was an affront to Christian values. Secretly, some saw smallpox as a way of controlling the population of the working classes who were breeding prolifically.. In working class circles there was another curious suspicion of vaccination. They rarely consulted a doctor and their most frequent contact with the medical profession was when there was an epidemic. The simplistic conclusion was that doctors brought disease and compulsory vaccination was another part of the capacity of doctors to generate illness rather than cure it.

Playfair was adamant that good public health demanded the control of smallpox by compulsory vaccination. On 19 June 1883 a motion was introduced in the House of Commons by the member for Leicester as follows: 'That, in the opinion of the House, it is inexpedient and unjust to enforce vaccination upon those who regard it as inadvisable and dangerous.' Playfair made a fine speech against the motion in which he marshalled all the scientific evidence for the benefits of vaccination. It cannot have been easy listening; even Playfair suggests,'I fear I have wearied the House by statistical results.'

But this was a fine scientist speaking with authority, and the amendment was carried by 286 votes to 16. One would have thought that this was the end of the matter. However, some months later a long pamphlet was issued with a virulent attack on Playfair, with the intriguing title 'Sir Lyon Playfair taken to pieces and disposed of'. It questioned his stature as a scientist and he was deeply hurt by the attack. The author of the pamphlet was an unknown writer, William White. There is a copy in the National Library of Scotland. It is verbose (168 pages long) and strident. None of the evidence adduced by Playfair stands up to scrutiny by a rational person, or so William White claims. A short quotation will give the flavour of the complete work:

> 'Always curious and eager to hear what can be urged in justification of a practice which is a survival from the pre-scientific age, we followed Sir Lyon Playfair attentively, but anything more hopelessly commonplace than his discourse it would be difficult to imagine. The stalest fallacies of the vaccinators were recited as if they had never been answered. The freshness consisted in the business-like assurance and plausibility, after the Scots manner, with which the speech was delivered. Not a single novel point was made.....We all love to have our prejudices flattered, and never more than when we suspect them to be questionable.'

Throughout the pamphlet White questions Playfair's statistical evidence but, as we all know, there are lies, damn lies and statistics. By modern scientific standards neither case, for or against vaccination, is completely vindicated by the statistical evidence. White claims that the decline in the number of smallpox is due to improved hygiene but, with our knowledge of the transmission of smallpox, it is certain that this is not the case. In reading the pamphlet it is clear that White was not a scientist and one wonders if his fundamental objection was a moral or religious one and that he uses the scientific data merely to confirm his views. You get the same attitude amongst some propagandists of special creation.

Who was William White? He wrote a short and generally unrevealing biography. He was born in Glasgow of Quaker stock but rebelled against the tedium of Quaker meetings for worship and the evangelical zeal of the school to which he was sent. His rebellion against organised religion was reversed when he read, quite by chance, a book by the Swedish scientist and mystic Emanuel Swedenborg. Swedenborg is, today, an essentially unknown figure but, in his time, he was a person of some substance. Born in 1688 in Stockholm, the son of a Lutheran bishop he studied science at Uppsala University, travelled abroad to meet some of the greatest natural philosophers in Europe and quickly established himself as one of the foremost intellectual of his day. He was put in charge of the mining industry in Sweden and set about writing books describing the state of understanding of all branches of natural philosophy. The language he used was Latin and, except where translations have been made, they are now substantially unread. At the age of 55 he underwent a curious conversion that caused him to switch from science to theology and he wrote a series of somewhat wordy books in Latin based, so he claimed, on conversations he had with angels on religious matters. The new doctrines he proclaimed were complex and attracted the attention of some distinguished people: William Blake, Ralph Emerson, August Strindberg, WB Yeats and, somewhat incongruously, John Wesley. The best known modern commentator is the poet Kathleen Raine, a friend of Gavin Maxwell and from whom he got the title of his trilogy 'Ring of Bright Water'. For present purposes it is sufficient to say that Swendenborg blurred the distinction between the material and the spiritual. White embraced Swedenborg's teachings and became manager of the bookshop of the Swedenborg Society in London. Unfortunately he was dismissed under a cloud and all photographs of him were destroyed.

According to the current Secretary of the Swedenborg Society there is nothing in the mystical teachings to oppose vaccination and so he feels that membership of the Society was not the origin of White's dismissal of vaccination as 'a great delusion'. However, Roy Porter, the distinguished historian of medicine, took rather a different view. In the Cambridge History of Medicine he wrote: 'Influenced by the teachings of the mystic Emanuel Swedenborg, some groups went further, discarding medicines altogether, and trusting to the healing power of Nature, aided by water, prayer, self-control and spiritual illumination.' The end of the road was, of course, Christian Science, which denies the reality of sickness.

My own view is that White's denial of the efficacy of vaccination was, in some measure, the consequence of his Swedenborgian beliefs, but his intemperate language is alien to the mild-tempered Swedenborg

movement. Subsequent events have proved, of course, that Playfair and Jenner were right and White was wrong. The anti-vaccination movement is now a very pale reflection of its former self. In the global eradication of smallpox, which was completed in 1975, Jennerian vaccination played an essential part and St Andrews University can feel proud of its wisdom in awarding him an MD even if, at the time, it was merely after his money.

Swedenborg died in London in 1772 and is now largely forgotten. Jenner towards the end of his life was a widely revered figure and has remained so ever since. Playfair, greatly honoured by a grateful nation, died in 1898 and is buried in the Eastern Cemetery in St Andrews. His physical memorial is a water fountain near the Royal and Ancient clubhouse but his contribution to public health is his true memorial.

THE THIRTEENTH HALDANE TAIT LECTURE

The Thirteenth Haldane Tait Lecture was held on 5th May 2003 at the Pollock Halls, Edinburgh. The speaker was Professor Alastair Geddes who gave an absorbing and wide ranging talk on the History of Bioterrorism.

THE ONE HUNDRED AND SIXTY EIGHTH ORDINARY MEETING

The One Hundred and Sixty Eighth Ordinary Meeting of the Society was held at the Royal College of Physicians and Surgeons in Glasgow on 20th March 2004. Two papers were read. Professor Matthew Kaufman talked on Medical Education in 18th and 19th Century Edinburgh and Mr Roy Miller talked on The Man who Saw his Own Voice.

THE MAN WHO SAW HIS OWN VOICE

It is, of course, impossible to see a voice. We hear a voice, and hearing is all important in the formation of voice. The person who has marked hearing loss in the high tones will speak with a flat voice. A child born of Indo-Pakistani parents and reared in Glasgow will speak English with a Glasgow accent, as well as his native Urdu heard in the home, without the slightly higher pitched tones of his parents. This talk is about the organ that generates the sound converted into voice, be it sung, spoken, shouted or whispered, by means of tongue, lips and palate - namely the larynx.

The vocal cords within their protective cartilaginous box are two fine membranous bands which, at rest, lie close to the side walls allowing quiet breathing. In action they approximate and the column of air forced up the wind-pipe by the lungs acting as bellows makes them vibrate. These vibrations are controlled by fine muscular bundles which dictate how quickly the cords vibrate, the length of the vibrating portion, and the intensity of the sound produced.

Down the ages man has been intrigued by the mystery of voice and has striven to visualise the organ that generates it. Guthrie, in his History of E.N.T., written with Scott Stevenson, relates how Galen in the second century A.D. described the anatomy of the larynx and insisted that the larynx was the instrument of the voice. Confuting the beliefs of the old Greek philosophers he wrote, 'They will wonder when they hear the voice is produced from the brain, and much more, after having heard that all voluntary motion is produced by the muscles, for the muscles move certain parts upon which breathing and the voice depend, and they themselves in their turn are dependent on the nerves from the brain.

Several French physicians made relevant observations regarding the voice. Ambroise Paré wrote that when the laryngeal cartilages are open the voice is like the basse contré and with them compressed, the voice is shrill. Dodart, in 1700, stated that vocal tones depended on the tension of the lips of the glottis, and the tones were modified by the concavities of the mouth and nose. In 1742 Ferrein was the first to apply the name vocal cord to the lips of the glottis. Among the innumerable inquisitive minds we can count the great Leonardo da Vinci. Having dissected out a human respiratory tree and squeezed the lungs he studied the sounds produced in the larynx. A singing teacher, three hundred years later did the same, because of his intense interest in vocal cord function He was Manuel Garcia, born in Zafra in Catalonia on 17 March 1805. His father was a singer, composer, teacher of singing, and an impressario. His mother was an accomplished

actress. His two sisters became eminent opera singers. The children were educated by their parents. At 15 Manuel studied harmony with Fetis in Paris, and sang in opera in Madrid with his father.

The family migrated to the USA in 1825 where his father founded an opera house - in New York. While touring Mexico the company was robbed of their earnings- reputed to amount to £6000 in gold. They returned to Paris where Manuel decided he preferred teaching singing to performing. He appears to have claimed to suffer voice strain. In 1830 be took a sabbatical, enlisting in the commissariat of the French army in Algiers. On his return he studied medicine in the military hospitals in Paris: This gave him an opportunity to further his almost obsessive interest in how the voice is produced. He too, dissected animal and human respiratory systems, and unwittingly repeated da Vinci's experiments. In 1840 he presented to the French Institut, as a result of his studies, his "Memoire sur la voix humaine," regarded as the best authority on the subject at that time. He became a professor at the Paris Conservatoire and had many famous pupils, including Jenny Lind, whom he taught for a year from Aug. 1841 to July 1842. His "Traite complet de Part du chant" of 1847 became world famous. He was a prominent figure in literary and artistic society.

In 1848 there was a minor revolution against the French King, Louis Philippe, who had begun his reign in 1830 as the elected "citizen king" but became corrupt, giving bribes, tampering with trial by jury, and restricting the freedom of the press. He fled to England in disguise and Garcia was one of the refugees who followed him across the Channel. He arrived in London in June 1848, and by November was appointed as Professor of Singing at the Royal Academy of Music. Garcia still pondered how exactly vocal cords worked and felt frustrated by his inability to see living vocal cords in action. He seems to have been unaware of the attempts of others to do so. In 1807 Buzzim of Frankfurt am Main described a laryngeal speculum which was a periscope-like tube enclosing a vertical partition to form two parallel channels. At the far end of each was an angled mirror, one of which was meant to convey light to the larynx while the other allowed vision of the larynx. A wax candle with a reflector supplied the illumination, He saw nothing distinctly, and probably singed his hair in the process.

Benjamin Guy Babington has been claimed by many as the true inventor of mirror laryngoscopy. He was undoubtedly a remarkable man. His middle name came from being born, in 1794, in Guy's Hospital where his father was on the resident staff. He developed an interest in organic chemistry, and the study of blood and urine. By his laboratory work he helped his brother-in-law, Dr. Bright, investigate kidney disease. After working as a physician at Guy's for 25 years he left to found the "Epidemiological Society" and was its President from 1850 to 1864. He was fluent in Tamil, Sanskrit and Latin. He painted and sculpted, and excelled at shooting and billiards.

Babington's most recent champion was Sir Donald Harrison writing in the Journal of Latyngology and Otology in 1998. Another famous laryngologist, Sir Morell Mackenzie, described in detail in 1864 how Babington's "ingenious instrument," first shown to the Hunterian Society in 1829, was used. The instrument had a long curved shank "at the end of which was an oblong piece of looking-glass set in a silver wire". The other blade was a tongue depressor. "The instrument should be dipped in water, so as to have a film of fluid on it or the habitus of the breath renders it cloudy." The patient sat with his back to the sun. The examiner reflected this light into the mouth with a mirror held in his left hand, and introduced the instrument with his right hand. Squeezing the handles together, the tongue was depressed by one arm and the palate elevated by the other which carried the mirror. Mackenzie records that the tongue depressor was abandoned soon after. Babington must have been disheartened by his - patients gagging so much. Interestingly he named the instrument his "Glottiscope" and never claimed to have viewed the vocal cords even after learning about Garcia's paper which was presented at the Royal Society 26 years later.

Quite independently Garcia arrived at the idea of mirror laryngoscopy. On a visit to Paris in September 1854 he recounted how the solution came to him while he was standing in the courtyard of the Palais Royal. It lay in a combination of reflection of the sun flashing on the window panes and realisation of the use of its power to provide illumination. "Suddenly 1 saw the two mirrors of the laryngoscope in their respective positions, as if actually present before my very eyes. I went straight to Charrière, the surgical instrument maker, and asking if be happened to possess a small mirror with a long handle, was informed that he had a little dentist's mirror, which had been one of the failures of the London Exhibition of 1851. 1 bought it for six francs." He also bought a handmirror and rushed home to stand at a window through which bright sunlight shone. With his back to the light, holding the handmirror in his left hand so that the sunlight was reflected onto his face and wide open mouth he introduced the dental mirror, warmed, into his throat with his other hand, until it leaned against his uvula.

He describes the event himself thus:- "By an almost incredible good fortune I got the proper angle at the first attempt. There, before my very eyes, appeared the glottis, wide open and so fully exposed that I could see a portion of the trachea. So astounded was I that I sank back into my chair, aghast, dumbfounded. I was the first human being to see the larynx of a living man, and that man myself. Slowly I recovered from the shock and rose again to my feet. After a few attempts I got the exact angle for the second time and again the vocal cords made their appearance in the little circle of glass. Next I experimented in emitting various single notes, an upward scale, a downward one, an arpeggio, the registers. Then a laugh, a cry, all sorts of queer sounds, animal imitations, whatever came into my head. On and on I went, like a madman, until the voice was so completely tired that I had to remain silent for a long time."

On his return to London Garcia conducted a series of self-observations on the different phases of singing. On 24 May 1855 he presented to the Royal Society through its secretary, Dr. William Sharpey, his paper "Physiological Observations on the Human Voice." It contained remarkably accurate observations of the cords in inspiration, phonation, in singing from chest register to falsetto and during the various types of artistic singing. Garcia had no idea that his discovery would be of such importance medically. His only joy was to be able to describe how the vocal cords moved - and the help this might give in his teaching.

English doctors were either incredulous or plain apathetic. Czermak, a professor of physiology at Budapest, realised the medical value and became from 1857 the pioneer in the field of laryngology. He was the first to turn the oral mirror through 180 degrees to view the nasopharynx. He used artificial light as the reflected source, and concentrated the beam by using Ruete's large concave ophthalmic mirror as reflector. It had a central hole in it, thus one could look along the centre of the reflected beam. One had only to strap the concave mirror to the forehead and the ENT mirror, as we know it would be born. Actually, a relatively unknown surgeon at Charing Cross Hospital, called John Avery, sought to examine the various canals of the body with the aid of a speculum and a reflector in 1844. His obituary in the Lancet in 1855 said: "By means of his lamp-tube and reflectors he was able to examine the ear, urethra, bladder, oesophagus and larynx as probably no surgeon before him has ever examined them." This seems an unlikely claim. The reflector was clamped to the examiner's head by a spring mechanism, and could be rotated but illumination was by a candle which had to be held next the patient's mouth and the apparatus weighed about a pound. The speculum had an angled mirror at the end to view the larynx.

Garcia remained professor at the Royal Academy for 47 years, only retiring in 1895, at the age of 90. He was still alert and active. He continued to teach privately and remain interested in musical affairs until he died, aged 101. For more than half a century Garcia was the premier singing teacher in the world. He was a handsome man with the fiery temperament of Catalonia, and his father. His chief recreation was chess. On 17 March 1905, his 100th birthday, he was received at Buckingham Palace by King Edward VII, who created him C.V.O. Kaiser Wilhelm II conferred on him the gold medal for science. The King of Spain admitted him to the order of Alphonso XII. The King of Sweden made him Chevalier of the Order of Merit. A banquet was held in his honour, attended by a host of distinguished guests, at which he was presented with his portrait, painted by John S. Sargent. Garcia left the portrait to the Laryngological Society.

As a postscript I must say that Garcia was fortunate in having a relatively insensitive and a capacious pharynx. He had not recognised the valuable diagnostic tool that laryngoscopy proved to be in the hands of two great doctors. Czermak probably did the most to popularise it, but his rival Turk, a neurologist, of Vienna made clinical use of it first. .He used sunlight for illumination but seemed deficient in the dexterity required for easy viewing, soon giving up the struggle. Czermak, who was a professor of physiology, actually borrowed one of Turk's mirrors intending to repeat Garcia's findings and discover how the guttural sounds of Arabic were made. Turk eventually persevered to the extent that he was able to produce an atlas, and a textbook of laryngeal disease. He also was the man who realised that pulling the tongue forward improved the field of vision. Morell Mackenzie who was sent by Queen Victoria to examine the larynx of her son in law, Crown Prince Frederick, learned mirror laryngoscopy from Czermak. Laryngologists remember Czermak, but it was Turk who had a statue erected in his memory. I, however, think that Manuel Garcia fully deserves all the honours which were heaped upon him.

THE ONE HUNDRED AND SIXTY NINTH ORDINARY MEETING

The One Hundred and Sixty Ninth Ordinary Meeting of the Society was held on 12 June 2004 in New Hall, St Andrews. There were two speakers, Professor Hugh MacDougall talked on the History of Oncology and Dr Angela Montford talked on Healing Friars

"BROTHERS WHO KNOW MEDICINE": HEALING FRIARS AT THE BEDSIDE

Apparently the younger generation is under the impression that all the knowledge in the world can be found through the search engine Google. Whether it can or not, the Internet can be a very useful thing. My research has been on the involvement of friars with medicine, as patients and practitioners and, putting the phrase 'Dominican doctors' into Google produced material on the Dominican doctors of the church, theological scholars like Thomas Aquinas or Albertus Magnus, and references to medical practice in the Caribbean. However in this haystack of information I also found the needle which led me to the site of the Biblioteca Schoenbergiensis.

Lawrence J. Schoenberg of Pennsylvania, who owns this collection of manuscripts, has had a long association with mediaeval history as a collector. In a great service to mediaeval scholars around the world, he has put the details of his collection onto the Internet, complete with some facsimiles, for free consultation and use by anyone, provided that he is sent a copy of any publication which refers to his collection material.

The Dominican Doctors link on Google was to one of these manuscripts, **Ms. ljs024**, catalogued as a medical miscellany. This has eight of the texts used in, or as supplements to, the *articella*, the set books for mediaeval medical students, which gave them a basic introduction to medical theory and practice, including physiology, diagnosis, prognosis and therapeutics. The manuscript has attractively decorated initials in red and blue penwork, (as well as twelve historiated initials or large capital letters with pictures. Nine of these initials show Dominican friars, dressed in their customary black and white habit, one, for example, showing a friar teaching a group of students, and alongside are marginal glosses, the notes made by a reader. Another example shows a friar teaching students dressed as laymen. Although the lecturer appears to have on a black and white robe, it looks as though he has curly hair and no tonsure, indicating that he was not a cleric. Other pictures show the Dominicans, or their lay assistants, involved in doing a number of different medical tasks. The words 'lay' and 'secular' are used to describe those who have not taken religious vows.

I asked a present-day Dominican friar to look at the friars' habits and he tells me that these were clerical members of the order, priests rather than the lay brothers, who usually did much of the manual work around the convents, like gardening, cooking or nursing the sick. A portrayal of St Dominic, the Order's founder, shows him wearing the same black and white robes. The manuscript has been identified as French, and the style of its illustrations and presentation identify it as Parisian. The early Dominicans had a prominent presence in Paris, with their convent of St Jacques being founded in 1220 in the university quarter. The drawings were done by a workshop around the corner from the convent, a place known to produce other manuscripts for the friars. But what was the message sent by these illustrations? Why should Dominicans, an order of preaching friars, be shown working as physicians, and what exactly were the tasks they were doing? I hope to answer these questions by describing what's in the manuscript, its texts and illustrations, as well as telling you about the Dominicans, their work, education and rules, and to tie all together to see where medical knowledge and practice might have fitted in to their religious vocation.

The Dominicans were an Order of Friars founded around the same time as the Franciscans, in the early thirteenth century. Their original aim was to tackle the problem of heresy, which was rife at the time. Although the Dominicans weren't ever specifically directed to give help to the sick, this was a charitable obligation for all Christians, counted as one of the seven works of mercy. In the mediaeval mind, body and spirit were united, the health of one influencing the health of the other. Unlike monks, who lived and prayed in a secluded monastery, the friars worked and travelled in towns and cities, They were more in touch with society's medical problems and the domestic sickroom could become quite crowded with friars on their competitive errands of mercy, a 13th Century anecdote telling how a friar called on a woman with a sick baby only to find that two other Dominicans had got there already.

Education, study and preaching were central to a Dominican, with the best students attending universities such as Paris, Bologna or Montpellier, centres for medical teaching in the Middle Ages. Friars would first do an arts course, and those going on to a higher degree would study natural philosophy, which included the subject of *physica,* or medicine in its broadest sense, before going on to read theology. Four of the historiated initials in the manuscript show Dominicans studying or teaching texts. The collection of Greek and Arab works used for medical teaching, were supplemented from the late twelfth century with a number of other works, usually including the five or six texts known as the 'books of Isaac', written by Isaac Judeus, a Jewish physician working in Tunisia in the tenth century. These texts of Isaac and many others from the Greek and Arab world were translated into Latin. Examples include the *Isagoge,* an introduction by the 9th c Arab

scholar, Joannitius or Hunain ibn-Ishaq, to the works of Galen, the works of the 4th century BC school of Hippocrates, the writings of the 10th century Arab polymath, Avicenna, or Ibn-Sina and a text on the pulse, by the 12th century French cleric Gilles de Corbeil, who had written an earlier text on urine in verse.

How would the friars have used this medical knowledge? The 13th century Dominican Roland of Cremona, wrote that medicine was a most valuable tool for a preacher as it could be used in drawing morals and constructing allegories when writing a sermon. Certainly some of the friars included medical similes and metaphors in their theological writings, for example, 'as there are two types of medicine, gentle and harsh, curing by the application of plasters or if that is not successful, by cutting or cautery , so there are two methods of moral correction, the gentle and the harsh'.... Others wrote about Christ as perfect in everything, including his health, because all his bodily humours and temperaments were perfectly balanced, a state to be sought to gain salvation. Another frequently used simile compared the wine of the Eucharist to medicine or Christ to an apothecary, who could heal the ills of mankind with his prescriptions. But friars also included medical advice and recipes in their sermons or wrote texts of practical instruction on medical matters, giving explanations of the causes of disease, advice and recipes, which suggests that some had access to more advanced information. So a certain amount of specialised medical knowledge acquired from a university was probably approved by the Dominican Order for these purposes.

The friar in the Schoenberg manuscript illustration **(f. 121v)** is holding a urine flask in his left hand and pointing with his right hand to a seated person, presumably a patient, who seems to recoil, perhaps from an unfavourable prognosis. The technique of uroscopy, along with pulse-taking, played such a part in mediaeval diagnosis and prognosis that the urine flask is universal in pictures illustrating a member of the medical profession. Another illustration shows a tonsured mediaeval physician in his scarlet robes, not a friar, doing uroscopy in the same way, examining a urine sample in a glass flask and also taking his patient's pulse. The mediaeval diagnostician used urine charts to identify and classify the precise appearance, colour and content of the sample and assess the significance of its smell, taste, and turbidity presence of foreign matter. The 14th century English physician, John of Gaddesden, who also wrote on the differential diagnosis of fevers, diagnosed tertian fever (malaria) by the appearance of the urine, thin and red-brown, bright below and dark above. When Gaddesden was discussing the diagnosis of *februs ethicus*, or hectic fever, seen in pthisis, he suggested that the physician could see things like scales of bran in the urine, which he called crinoid bodies.

Another illustration shows a Dominican friar explaining a point to a standing patient, **(f. 98r),** the surrounding text concerning the importance of maintaining or restoring body moisture in hectic fever by diet and cold applications. Fevers were a recurrent problem in the Middle Ages and one contemporary encyclopaedia listed 10 or more different kinds, tertian, quartan, hectic, putrid etc. Both the fever text (*Liber febrium,* **ff. 91r-136r)** and the urine text (*Liber urinarum,* **ff. 85-90v)** were part of the six 'books of Isaac' [Judeus].

An illustration of a Dominican *medicus* taking his patient's pulse **(f. 6r)** is found at the opening of the section ‚*Liber de pulsibus*, the book of the pulse, by Philaretus, a seventh century physician, and the same work also circulated under the name of 'Galen' or the ubiquitous 'Anon'. The illustration shows the placing of three fingers flat along the side of the wrist below the thumb, to feel the radial pulse. Assessing the pulse was quite sophisticated, with up to ten categories being described in detail, dimension, length, strength, volume, regularity, and so on. The technique was thought to be rather difficult, and one fourteenth-century physician, Bernard de Gordon of Montpellier, noted that it required 'intelligence, sense of touch, knowledge of musical proportions and long experience'and complained about his own 'weak competence'. Around the same time Italian physicians were particularly interested in assessing the musicality of the pulse as a way of helping to describe it.

Another folio **(f. 16r)** shows three laymen seated at a dining table with a selection of food such as meat, fish and some kind of drink in front of them. These figures probably represent taste, smell and sight, the senses involved in the appreciation of food. The illustration introduces another of Isaac's texts, *De dietis universalibus*, a discussion of the importance of adjusting and moderating the daily diet as a means of maintaining good health. Diet a common mediaeval medical therapy, was known as 'the first instrument of treatment.' Often, it was only when diet alone was unsuccessful at altering the disordered state of the humours that the practitioner turned to more specific drugs or surgery.

The value of a therapeutic diet is reinforced by another historiated initial **(f. 65r)** showing a friar supervising a servant bringing a tray of food to a patient in bed, in one of the six scenes which include a patient. This part of the text is a discussion from Isaac's *De dietis particularis* (the therapeutic diet), which

opens with a reference to the value of fruit, vegetables and cereals in specified illnesses. Barley tisane or soup was a favourite treatmen,t a mediaeval recipe stating: ' Diluted with cold wine, it nourishes a worn-out stomach, with warmed wine it does marvellously for dysentery; and diluted with clear water is good for those with a fever.'

This initial capital letter 'Q' at **f. 7v** is described in the Schoenberg catalogue as containing a picture of 'a Dominican doctor standing explaining the different kinds of food laid out on a table'. However, the picture is placed at the beginning of Gilles de Corbeil's tract on the pulse. There are four amorphous shapes on the table surface, behind which the friar stands with didactic finger aloft. I think the catalogue entry is wrong here, and this scene corresponds to the opening word of the section, 'quattuor', the Latin number 4, referring to the four most important parts of the body according to mediaeval physiology. The subsequent text describes these as the brain, the liver, the heart and the testicles and notes how the pulse could be used to diagnose ailments in these organs.

Other pictures of the friars show servants dressed in short red or blue tunics. One servant is putting a garment like tunic or jumper over the bedclothes of a patient resting in bed **(f. 94v).** This detail also appears in the chapter on fevers, alongside a description of the feelings of cold and shivering in a rigor, so it probably refers to the need to provide extra warmth in these cases.

Another **(f.103v)** shows a servant bringing a narrow cloth to a seated patient, perhaps showing treatment for a fever caused by specifically-located infection with accompanying pain. The poultice shown in the initial appears to be held at each end by a panel of the servant's tunic, suggesting that the material was applied hot. In the preceding column of the folio is a recipe for a *cataplasma* or poultice, using mallow, hot oil and barley flour. The text is about problems originating in the stomach or liver, and such treatment would be suitable for these sites. There are other similar recipes for treatments in medical texts, using herbal or mineral ingredients with hot oil and barley meal, or cloths wrung out in various hot herbal preparations to soothe pain and inflammation. Mastic, an imported medicinal resin, was another material that could be warmed and spread onto a piece of parchment, to provide a comforting adhesive application for the stomach. In the fifteenth century, Christopher Columbus spent some years as an importer of mastic before setting off on his voyages of discovery.]

Thus there are illustrations of friars apparently teaching and studying medicine, and also doing practical medical tasks such as taking pulses, examining urine, advising patients on diet and supervising treatments. Were they just using these skills working in the convent infirmaries? For example, in a Dominican convent in Perugia, we can read about brother Andrea Raycha (d. 1334) who was an apothecary before he entered the Order and used his previously acquired skill to look after the sick '*ut medicus*', 'like a doctor', using spices that he kept in his room. Dominican friars certainly took it in turns to help with infirmary nursing and many contemporary medicines were made and administered domestically. This can be seen in an illustration of Francis of Assisi tending Fr. Morico, ill in bed. There is equipment for making simple medicines and a friar and an apothecary who might be a convent servant or a shopkeeper. But it wasn't necessary for a convent infirmarer to have had any previous experience of either medicine or nursing, an apothecary was not quite the same as a doctor, and illustrations show friars treating secular patients rather other friars.

So if they were treating secular patients, was this allowed The Dominican Order certainly recommended that friars who had useful legal or medical knowledge could use it to help those in need. Canon Law allowed this although there were some limitations, such as that medicine had to be practised as charity, with the charging of fees by religious doctors generally meeting with disapproval. During my research I've found about 80 friars who either wrote about it or practiced medicine.

As well the names of some known individual practitioners and the pictures in the manuscript, the main evidence that Dominicans did work as physicians is found in the records of the Order's Chapter meetings between the thirteenth and sixteenth centuries.. The presence of medical friars was unequivocal, the clauses referring to 'brothers of physic in our province,' 'our medical brothers', 'friars giving medical advice to their brothers', 'friars giving medicine, advice and treatment to secular patients' and, with rather alarming concern, 'brothers practising medicine or surgery ...among whom there are many who are inexpert.' Each convent was told that it could have just one *medicus*, who might be either a brother or a secular. I've found references to friars in Portugal who were practising medicine on secular patients, including women who came to the convent looking for help, advice, or medicine. One of the annual inspections of a convent in France reported that sick nuns were looked after not only by an external physician, a surgeon and an apothecary but also by 'a friar who was an expert and skilful *medicus*'. Although the numbers involved were probably always few, it is possible to find many written indications that some Dominican friars not only gave practical help to sick brothers in the convent infirmary, thus saving money as well as being charitable, but they also treated sick nuns and lay patients of both sexes.

As a postscript to this conclusion, I'd like to take a brief look at some of the reasons why Dominicans eventually stopped medical practice. Probably both groups - the medics who had practised before joining the Order, and the less-experienced friars with some theoretical knowledge - produced their own problems. The Dominican Chapter regulations suggest several reasons for controlling and reducing medical practice, such as neglect of religious duties, the problem of charitable versus paid treatment, and the impropriety of a religious man treating women patients. Putting one's trust in earthly medicine rather than religion was always problematical and one thirteenth century Portuguese Dominican physician and saint, Giles of Santarèm, was led to remind other medical brothers and patients that Christ was mightier than Galen.

Many mediaeval churchmen were particularly alarmed at the prospect of close physical contact with women and that is why the anointing of sick women by the friars, which involved touching their bodies in seven places, had been discontinued in 1242. One Dominican Chapter regulation instructing medical friars not to treat lay patients without permission was immediately followed by another clause reminding friars that they mustn't use a bare hand to touch the flesh of a woman- suggesting that the two clauses could have been connected. The medical treatment of nuns was fraught with danger for any man whether in religious orders or not. Rules concerning Dominican nuns stated first that medical visits must be chaperoned, and later that medical men were only allowed to discuss the patient's illness with the sister concerned from the far side of the enclosure grille. If the nun was too ill to come to the grille, it was sufficient for the physician to inspect her urine and make a diagnosis from that. The need to implement some sort of control over the situation, whether the physician in question was a friar or a secular, could have been prompted by such scandals as the one in 1270 when a Dominican nun in Strasbourg feigned illness and ran away with the convent physician.

As early as 1249 a local Dominican Chapter had ruled ' Our medical brothers from now on shall not undertake the cure of anyone other than our own brothers, and lay brothers of the order shall not practice the judgements of urine and pulse'. Although it is clear that medical treatment continued in other places, probably because of a shortage of doctors for the poor, a very important concern, one repeatedly stressed, was whether the medical brother had adequate skill. Theodoric of Bologna, one of the best known Dominicans in medicine, had written that in surgery, 'people are killed...by lack of skill'.

Friars were told not to give medical advice unless they had already acquired sufficient knowledge before joining the Order. In 1299 following a papal decree the Dominicans demanded three years previous study before a friar could treat anyone. At the same time, university, civic and guild authorities were beginning to introduce qualifying exams and licensing to regulate and control the work of doctors. By the turn of the fourteenth century the University of Montpellier, was insisting on two months of practical experience each summer for medical students in addition to their study of theory. By the fourteenth century in Spain, four years of study was necessary, and friars certainly couldn't do this after they'd entered the Order. These rules helped to define the boundaries of the medical profession. The French surgeon Henri de wrote that he knew from Holy Scriptures that God acted as a physician and surgeon in creating the earth, in making Eve from Adam's rib, and healing the blind with an application of dust and saliva, but nowhere was it written that God took pulses, examined urine or inspected excreta, and his comments suggest a possible opposition to medical men in religious orders from secular members of the profession.

As far as the friars were concerned, lack of proficiency and 'brothers who are inexpert' could have serious consequences for patients and the reputation of the Order, but in spite of repeated restrictions, that some problems did continue. For example, in 1336, the General Chapter still noted that friars had to be *peritus in sciencia medicine,* 'skilled in the knowledge of medicine', before they could practice and, in addition, should either have obtained a licence while still a secular or had special permission to practice from their prior provincial. This kind of restriction was repeated at lengthening intervals, eventually with the threat of defrocking or imprisonment, until in 1553 the General Chapter at Rome decreed for the last time: 'we ordain and most strictly prohibit every one of the friars of our Order, under the pain of very grave fault, from following the art of medicine as physician or surgeon and all permissions granted previously are null and void.'

So does this collection of evidence explain why the Schoenberg manuscript of the *articella* shows Dominican friars doing medical tasks? I think it does. It seems to me that, in the first hundred years or so of the Order's existence, friars with medical training before joining the Order were allowed to use their medical expertise. It was probable also that other friars, who had learned medicine as part of their university course in natural philosophy, or had experience as apothecaries or who just had a flair for it, were allowed to help the sick. The illustrations of friars in the medical manuscript suggests that giving medical advice was an accepted and useful contribution to Dominican vocation, and we can be sure from other evidence that that medical friars treated nuns and seculars and their own sick brothers.

But I'd suggest that the rise of medical teaching in universities meant that literate, university-educated physicians didn't any longer necessarily have to be clerics. As the practice of medicine became a recognised and secular profession with its own institutional structure and control, it resulted in a narrower definition of what medical tasks were and who could do them. Urine testing, pulse taking, offering advice on diet, using poultices and prescribing medicines were now identified as medical tasks. Apothecaries now often had to work under the supervision of a physician. Raising standards with examinations and licensing for members of the medical profession, or (for the cynical) imposing restrictions on access to practice, meant that the friars weren't any longer seen as skilled enough to satisfy either the medical or the religious authorities.

But until 1553, it seems that some Dominican friars were recognised as medically capable and their work, whether they'd been officially trained or not, was much appreciated. Senior friars would have a friar-physician in their entourage. The really good ones could find employment in royal and noble households, like Friar Geoffrey Launde, at the end of the fourteenth century, who was granted permission to act as confessor to Edward, the Duke of York's son, and to practise medicine in his household, as well as on a circle of his friends and subordinates. Others could make themselves useful helping friars who fell ill in individual convents. A thirteenth century obituary from a Dominican convent in Florence recorded that one of these friars – not a university scholar in this case, but a lay brother called Guido- was so skilled at looking after the sick that his fellow friars nicknamed him 'Galen'. This shows not only their appreciation of his medical work but also their own knowledge of the founding father of mediaeval medicine – gained perhaps from their study of medical manuscripts such as the one I have described.

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This paper brought the 2003-2004 session of the Society to an end.