History 4 – Shepherd to Flexner Report

Francis Shepherd (McGill: 1875-1914)

Francis Shepherd was the single most important person in the development of gross Anatomy teaching at McGill during the first half of the university's existence. Raised in the small town of Como, Quebec near Montreal, he became a medical student at McGill in 1869 [How 11]. He was a clever student, but his bluntness of speech did not make him a class favorite. He made few intimate friends, but one of them was William Osler [How 28.] After graduation in 1873, Shepherd followed Osler to Europe where he undertook further training in Anatomy. While in London and Vienna, Shepherd dissected regions of the body such as the brain and internal visceral organs for the first time.

At McGill, by the 1870's, it was becoming realized by the medical faculty that excellence in the teaching of subjects such as Anatomy and Histology could be achieved only if these subjects were taught by knowledgeable experts in the field rather than simply assigned to staff members on a seniority basis irrespective of their qualifications [Hanaway 1: 75, 183]. It was on this basis that William Osler had been hired to teach histology. On the same basis, Osler recommended the hiring of Francis Shepherd to teach Anatomy, and upon his return to McGill in 1875, Shepherd was hired as Demonstrator of Anatomy. In the past, this position had been used mainly as a stepping stone for further promotion up the ladder and had thus been occupied by most of the medical faculty members at one time or another [Hanaway 1: 167; How: 73]. From now on this position was considered an important teaching position on its own merit [Hanaway 1:75]. Shepherd subsequently became Professor of Anatomy (as well as Professor of Surgery) in 1883, a position he held to 1913.

Shepherd was convinced that Anatomy needed to be learned mainly in the dissecting room and not just in the lecture theatre. His enthusiasm sparked renewed interest and prestige to a subject which had languished for many years under the professorship of Dr. Scott. He revised the laboratory experience, making attendance mandatory and systematizing the dissections. In addition, he now required McGill students to carry out dissections not only of the limbs, neck and back, but also of the internal organs of the thorax, abdomen and pelvis and of the brain. He initiated a system of laboratory exercises (which he called "grinds") to ensure that the students actually carried out their dissections [Hanaway 1: 73-7, 183; How: 73]. For the first time, students were now required to write a laboratory exam which actually tested their practical anatomical knowledge and emphasized the importance of their laboratory training [Hanaway 1:87]. During this era, the gross Anatomy training for students was very rigorous, occupying three to four hours per day, five days a week, for two six-month sessions held over the first two years of the medical curriculum. This

was followed by one final examination. McGill's emphasis on laboratory anatomy attracted students from the rest of Canada and the northern United States [Hanaway 1:53].

Although he emphasized the laboratory experience, Shepherd also appreciated the value of lectures. He felt that "they could give him the opportunity, as a professor, to help students to coordinate the facts they had learned in the dissecting room, and to show them the practical application to medicine and surgery. He could hopefully also communicate to them some of his own enthusiasm for a subject of enthralling interest" [How: 85.] His lectures were especially attractive due to his artistic use of the blackboard [Hanaway 2: 236].

In the 1890's, the number of lectures was decreased and the laboratory component of the anatomy teaching program was further emphasized. More demonstrators for laboratory instruction were appointed. Amongst all subjects, Anatomy took up most of the students' time. Five mornings a week, for thirty years, Shepherd gave the first hour's lecture on descriptive Anatomy. His lectures were interspersed with surgical cases showing practical applications. Each lecture was followed by a two hour laboratory where Shepherd himself was also a demonstrator. Most students then spent an additional two to four hours in the lab from 4:00-6:00 p.m. in the afternoon and then 8:00-10:00 p.m in the evening. [Hanaway 2: 135]. In 1894, when the academic year was lengthened from six to nine months, the evening sessions in the dissection room were discontinued [Han 2:135].

There were no examinations of any importance in the first year but the reckoning came at the end of second year with final exams in all primary subjects. Without a thorough knowledge of Anatomy, a student met with disaster. During the laboratory "spot" examination, students rotated through several stations at which they were asked to identify structures on pre-dissected specimens, the practice still followed today. A change of station was indicated by the ringing of a large bell. To some students this event may have brought to mind the famous quotation of the British poet John Donne: "Ask not for whom the bell tolls – it tolls for thee"! Years after graduating, some students still remembered the mixture of excitement and anxiety associated with the sound of this bell! As a result of the rigor of the program, McGill students became known throughout the world for their anatomical knowledge.

Shepherd was instrumental in creating the anatomical portion of McGill's Medical Museum. It was in great measure owing to his zeal and earnest work that the museum was placed in the first rank of American medical museums [Han 2:80]. During the Session of 1876-77, he published his a paper entitled: "Notes on Abnormalities Observed in the Dissecting Room of McGill University" which appeared in the Canada Medical and Surgical Journal. The contents of this paper indicated that he accepted Darwinism, then a comparatively new heresy, and this caused him some concern of offending the religious convictions of his parents [How: 92].

It may be noted that Shepherd always considered the subject of Anatomy as basically a means to an end, an essential training for medical and especially surgical practice [Hanaway 2: 135-136]. In viewing human anatomy as a handmaiden to surgery, he was following a medical school tradition of the past two hundred years which perhaps did not do justice to Anatomy as a science worthy of study in its own right [Singer Biol: 205].

In 1907, the Medical Faculty introduced a course in practical Anatomy for fourth-year students on Saturday mornings. This brought the total teaching time for anatomy to four hundred and fifty hours [Hanaway 2:135], whereas most other schools required a minimum of two hundred hours. Given the increased amount of material to be learned in other subjects such as Physiology and Biochemistry, many of the McGill faculty now began to think that too much time was being devoted to Anatomy [How: 174].

In 1908, Shepherd became Dean of Medicine and remained in this position until 1914. One of the academic giants at McGill, Shepherd gained an international reputation and was chosen as a founding member of the American Association of Anatomists [Hanaway 1: 184]. He was awarded honorary L.L.D. degrees from Edinburgh, Harvard, Dundee, McGill, and Queen's Universities [Hanaway 1: 186]. A tireless individual, he loved literature, art and travel [Hanaway 1: 185]. He was president of the Art Association of Montreal from 1906-1910 and again, after his retirement, from 1918-1929 [Hanaway 2: 73]. A commemorative plaque for Francis Shepherd is displayed in the Strathcona Anatomy and Dentistry Building. Two portraits of Shepherd exist, painted in 1924. One of them hangs in the C.P. Leblond Amphitheatre of the Strathcona Anatomy and Dentistry Building [Bensley: 46].

The Quest for Bodies: A Brief History of Dissection

In today's world, while some bodies come from unclaimed individuals, the majority of the cadavers provided to medical schools come from people who have generously donated their bodies in order to promote anatomical research and learning, the medical students in turn are deeply appreciative of this generosity.

Unfortunately, throughout most of the history of Anatomy, this was not the case. Until recent times, the dissection of human bodies has was strongly discouraged in all societies, and voluntary donations of bodies were unheard of.

As described earlier in this work, throughout the history of the Ancient World, human dissection was prohibited, with the exception of a brief window in Alexandrian Egypt. A similar prohibition occurred throughout most of the Middle Ages. Near the end of this period, with the development of universities, a very limited amount of dissection began to be permitted. Thus occurred first at

University of Bologna, famous for its law school, in which the government made available the bodies of one or two executed criminals per year. The use of bodies for dissection was reserved for convicted criminals, and the initial purpose was to investigate the cause of death. The supply of such bodies was of course very limited, and as more and more medical schools were created, a desperate paradox developed: The public insisted that physicians be trained in Anatomy, which could only be learned via dissection of dead bodies, but almost no provision was made for the legal supply of bodies.

In England, an act of Parliament in 1542 allowed the annual allocation of four bodies of hanged murderers to the Company of Barbers and Surgeons [Persaud2: 254]. Another Parliamentary Act of 1752 provided additional bodies of executed criminals, but the supply was still totally inadequate.

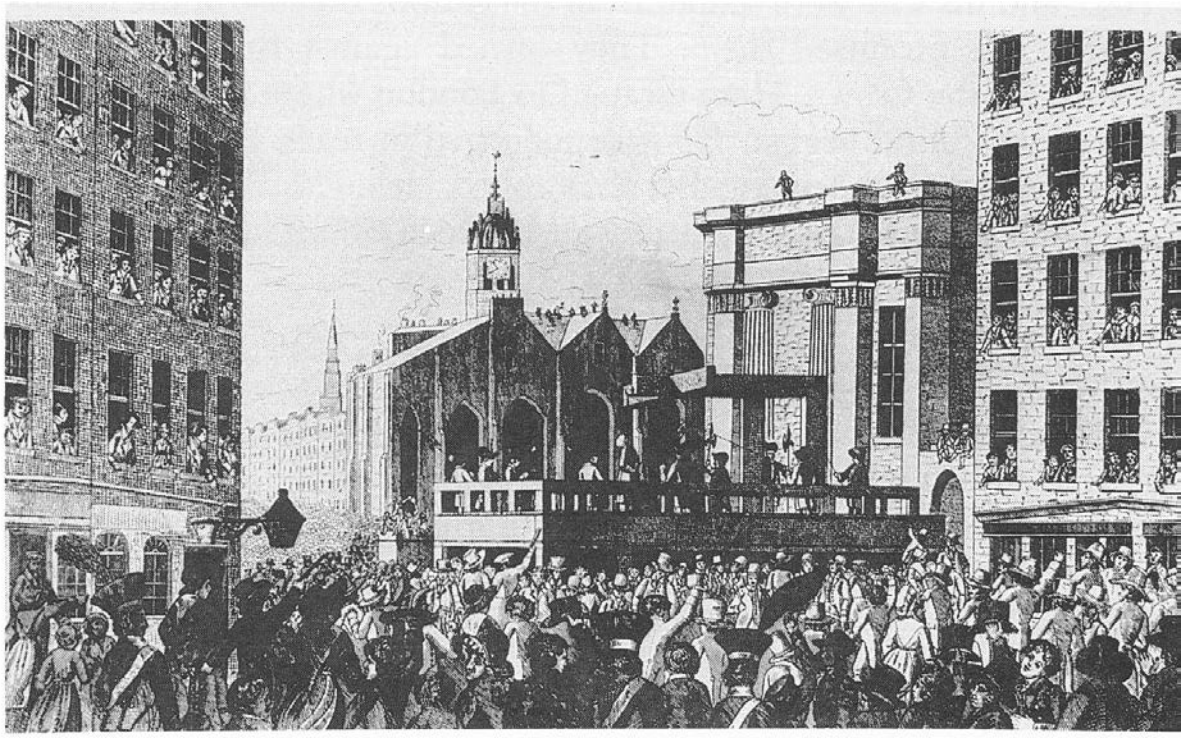
For the executed criminals, the dissection of their body was considered a part of their punishment, and this final desecration of his body constituted the felon's greatest fear. Thus the very act of dissection became associated with shame and disgrace. Under these conditions, the idea of any individual actually donating his or her body for dissection, a treatment reserved for murderers, was unthinkable [Persaud 2 256]!

In most European countries, the situation improved during the following centuries, and the governments gradually provided an adequate supply of bodies to their medical schools. This was not the case in Britain and North America, however, and the problem remained acute. Public hangings of criminals at this time were sensational spectator events, attended by thousands of onlookers. Attempts were often made to obtain the bodies of executed felons other than those legally designated for dissection. Thus anatomists from the medical schools would flock to the gallows at Hyde Park in London on hanging days to beg, buy or steal more bodies, and rush these back to their dissecting laboratories.

Since the numbers of executed criminals never matched need for cadavers, an obvious alternate answer was to steal newly-buried bodies from graves. Medical students or professors sometimes engaged in this activity, but most grave robbing came to be carried out by a mafia of gangs of professional body snatchers called "resurrection" or "sack-'em-up" men [Persaud2: 257]. Naturally, there was extreme resistance on the part of the horrified families, and they tried to prevent this grave robbing by placing the bodies of their loved ones within burglar-proof coffins or in secured mortuaries, sometimes protected by armed guards [Persaud2: 263]. Stealing of a body was not strictly illegal, as long as none of the person's clothing was stolen along with the body. Punishments by the law were therefore not excessive and the practice continued to be widespread.

Public indignation in Britain reached a peak in 1827 in the city of Edinburgh. In addition to stealing bodies from graves, two body snatchers, William Burke and William Hare, were convicted of murdering sixteen people in order to obtain their bodies. These bodies were taken to a medical

school laboratory, and, according to common practice, they were paid for with no questions asked by the resident anatomist. During the sensational public trial, William Hare gave evidence for the Crown and escaped punishment, but William Burke was hung on the gallows before an enormous crowd of 37,000 people. The body of Burke was then dissected in a packed anatomy theatre in which a constant stream of sixty people per minute passed by to see the grisly corpse. Finally, his skeleton was mounted in the medical school museum [Persaud 2: 182].



Public Hanging of William Burke

Unfortunately, the Anatomy professor who happened to be involved in this particular transaction was Robert Knox, one of Scotland's most respected surgeons and anatomists [Persaud 2: 172]. Called by his students "Knox primus et incomparabilis", he was the most popular Anatomy teacher in all of the United Kingdom. In 1828 he taught 504 students in his class, which required him to lecture three times daily on the same topic. By his association with the Burke and Hare scandal, Knox's reputation and career were completely ruined.

John Knox

As a result of the public outcry, the British Parliament passed the "Anatomy Act" in 1832, which made available the corpses of indigent people for dissection. A death certificate was required, and the remains of the body had to be ultimately interred in an appropriate manner. If members of the family objected to the dissection, their wishes were respected. Regional government inspectors were appointed to enforce this act, and things became much more peaceful in Britain from this time onward [Persaud 2:269-270].

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While these events were occurring in Britain, similar problems were occurring in North America. As early as 1661, at the University of Mexico medical school, the Spanish government had requested that teachers and students carry out anatomical dissections but this was rarely done due to lack of bodies. In the British American Colonies, cadavers had to be stolen for teaching and examination purposes, leading in some instances to extreme public hostility [Persaud 2: 286-288]. In New York City, for example, a riotous mob stormed the dissecting room of the New York Hospital Medical School, exposing the "mutilated" body parts to an enraged public. The Military quelled the riot and confined the medical students in prison to protect them from the wild passions of the populace. The confrontation between the Military and the crowd resulted in several deaths [Persaud 2; 298].

After the passing of the Anatomy Act in Britain in 1832, the state of Massachusetts acted quickly to enact similar legislation. However many other states delayed such action, and grave robbing continued to be an issue. During the 1870's, as many as five thousand cadavers were dissected in American medical schools, most of which had been stolen. On several occasions, irate public mobs of people attacked medical schools and burned the homes of physicians [Duffin: 33]. In many medical schools, dissection was not required because of the difficulty of obtaining cadavers [Persaud 2:299.].

Not surprisingly, the province of Quebec was one of the last places to resolve the problem of bodies [Hanaway 1:92]. Although an Anatomy Act was passed by the Quebec Legislature in 1843 permitting dissection of unclaimed bodies, the government imposed no penalties on those institutions which chose not to obey the law. Thus managers of many hospitals (except the Montreal General), lunatic asylums and poor-houses felt better about burying the dead than handing them over to "heartless medical students" [How: 75]. The medical students themselves did not help matters since they often joked about cadavers and regularly had themselves photographed with specimens in disrespectful poses [Duffin: 35].

Dissecting Class in Original Medical Building - 1880

Dissecting Class in Original Medical Building

Even during the time of Francis Shepherd in the 1880's and 1890's, most bodies were obtained illegally by stealing the bodies at night from new graves [Han 1:92]. Many of the body snatchers were the students themselves, especially the more daring francophone students who used the money for their tuition fees and board! Most of the bodies came from the Cote des Neiges Cemetery on Mount Royal. In winter, it was common practice to store the bodies in above-ground mausoleums, awaiting burial in the spring. This made the theft even easier! The bodies were stripped of their clothes, wrapped in a blanket, and taken by toboggan to the back door of the McGill Medical Building, where an attendant issued a receipt in exchange for the body. The next day, the students sent a representative to collect the money with no questions asked. The amount of money involved, thirty to fifty dollars per cadaver, amounted to several thousand dollars in today's currency. These robberies caused considerable hostility towards the medical school, particularly from the families from whom bodies were stolen. Since the clothes were always left behind, grave robbing was not an act of robbery and was considered simply an "offence against decency". The Anatomy Professor, Francis Shepherd, was convicted of this offence on several occasions, but the judge was basically sympathetic to the problem of the medical school, and he only charged Shepherd a fifty dollar fine with no further prosecution [Hanaway 1: 92; Persaud 2: 307].

Matters came to a head when the bodies of some nuns and their American pupils were stolen from a convent mausoleum. Parents had come from the United States intending to take the bodies of their children home for burial, only to find empty coffins [Hanaway1: 9]. In response to the outrage, the Archbishop of Quebec sponsored a new bill which was quickly passed by the Quebec legislature, this time with a severe penalty for non-compliance. With this legislation, the problem of body supply gradually became resolved [Hanaway 1:93; How: 77; Lawrence, D.G. Bull.Hist.Med. 32:408-424, 1958; Persaud 2: 308].

Conditions of Dissection in the Anatomy Laboratory

Until recent times, the conditions of anatomical dissection have always been very challenging to students, both physically and emotionally.

Until the discovery of formaldehyde fixative in relatively recent times, the bodies in the laboratory were never embalmed, and therefore were subject to rapid putrefaction. In earlier days, when cadavers were stolen from graves, etc., the body might already be several days old on arrival at the anatomy lab. With no means of preserving bodies, time was of the essence in carrying out dissections. It was best if the dissection were carried out during the coldest months of the year in an unheated laboratory. Even then, the dissection had to be completed in only a

few days, with the parts of the body most subject to putrefaction being dissected first. Even under these circumstances the cadaver had badly deteriorated and the smell was terrible.

An indication of the appalling conditions during the early era is seen in an anecdote which occurred in 1816 (thirteen years before the founding of McGill's Medical School). In this instance, an uncle and grandfather of William Osler visited a dissecting session in one of the anatomy schools in London, England. It was one of the only schools open in the summer, and the corpses were rapidly decomposing in the heat. His grandfather recoiled in terror from the stench. There was the body of an old man, the brain taken out and the scalp hanging about his ears, while his straggling white locks were matted together by his blood. A tub full of human flesh was standing near it, some pieces of which were given to eagles who devoured them. Twenty students were at work carving limbs and bodies in all stages of putrefaction and of all colors: black, green, yellow, blue and white. The pupils carved them apparently with as much pleasure as they would carve their dinner [Bliss: 5].

The order of dissection was dictated by the rapidity of putrefaction which occurred in different parts of the body. Since the intestines decomposed the most rapidly, the anterior abdominal wall was the first structure dissected, followed by opening the abdominal cavity to expose the stomach, intestines, pancreas, liver, gall bladder and spleen. Then followed the thoracic cavity containing the lungs and heart, and finally the abdominal posterior wall and pelvic cavity containing the kidneys, urinary bladder, and reproductive organs. The brain and spinal cord might then be removed and examined. This was followed by a study of the muscles of the limbs and finally the bones of the skeleton. The bones were routinely boiled for a long period in a stew to remove the remaining flesh. In some instances, they were put in a tub and exposed to the outside air where flies would efficiently remove the flesh in a couple of weeks. The student would then wire the bones together to form his own skeleton.

Since there was no knowledge of infection at this time, the students wore no gloves and rarely washed their hands. With no other instrument of analysis than the naked eye, students were also encouraged to use their sense of taste to distinguish the characteristics of mucus of various regions of the intestine, the gastric juice of the stomach, or even the semen! Death by infection was a constant occupational hazard for these early anatomists and medical students.

Many attempts were made to develop methods for preserving soft tissues so that they could be studied for longer periods [Persaud 2: 274]. In 1664, Robert Boyle showed that animal tissues could be preserved by immersion in alcohol. In fact, it had been a custom to transport bodies to the anatomy lab in barrels of whiskey [Persaud 2:44]!

The procedure of embalming bodies (i.e. administering fixative solution through the circulatory system) originated with Frederik Ruysh in the 1600's. He injected a special "liquor balsamicum"

into the arteries. Using his special techniques, he built up a huge anatomical museum which became famous throughout Europe. Unfortunately the composition of his fixative was secret and died with Ruysh himself.

By the 1800's, a large number of chemical agents were being used in attempts to embalm the body. Satisfactory results were obtained by arterial injection of a mixture of carbolic acid, glycerine, and alcohol. The body was then painted daily for two weeks with carbolic acid and glycerine, and then stored in an air-tight box over methylated spirits. Other chemicals such as arsenic and compounds of zinc, mercury and potassium were also used [Pauly: 11].

Finally, in 1867, August Wilhelm von Hofmann discovered formaldehyde. Arterial embalming with this excellent fixative quickly came to replace the use of all other solutions, and provided safe, long term fixation of cadavers. This revolutionary development eliminated the necessity for speed in dissection, the foul odors of putrefaction, and the dangers from infection.

In modern "arterial embalming", pre-embalming fluid is injected into the arterial system by means of a centrifugal pump or a gravity feed. The most common sites of entry are the common carotid artery or the femoral artery. This is followed by twenty liters of embalming fluid which are injected during a three hour period. In our laboratory at McGill, the fluid consists of 1 part formaldehyde, 1 part phenol, 4 parts glycerine and 12 parts methanol. In any regions of the body where the distribution of embalming fluid appears to be inadequate, local injection via hypodermic needle is carried out. The bodies are currently stored at 4 degrees centigrade, although in our old morgue they were stored at room temperature without ill effects. Initially, the bodies swell up considerably due to the accumulated embalming fluid but this swelling subsides during storage. In the morgue or dissecting laboratory, the bodies last indefinitely as long as they remained adequately moistened.

In recent years, certain innovations in our laboratory have improved conditions for dissection. For many years, there was no ventilation system other than opening the many windows. Since the 1990's, a modern ventilation and cooling system has made the laboratory and preparation rooms more comfortable and less exposed to fumes. The level of fumes is also decreased by the use of the chemical Infutrace which is injected into the circulatory system to wash out the formaldehyde without affecting preservation.

Since the 1950's, the gross anatomy lab has become a more sanitary environment. Disposable scalpel blades have replaced the earlier permanent knives and scalpel blades that had needed to continuously sharpened using a leather strop available in the lab for this purpose. Until the 1970's, inexpensive rubber gloves were not available for use in the laboratory and it was common practice to wear no gloves. With boxes of disposable gloves now available at a modest price, such a practice seems shocking to today's students.

McGill's Commemorative Service (1985-Present)

For the past thirty-five years, to honor those individuals who donated their bodies for the study of Anatomy, McGill University has held an annual Commemorative_Service. This non-denominational service, held at the end of each academic year, is one of the most moving events for students and faculty members in our Department, and was inaugurated by our departmental chair, Dr. Dennis Osmond, in 1985. Often held on a beautiful summer afternoon in June, the gathering takes place in McGill's Redpath Hall with its stained glass windows and its magnificent hammer-beam roof. Once the reading room of McGill's principal library, the hall is now used for concerts and ceremonial occasions [Frost 2: 297]. On a lectern on center stage is a book listing the names of the donors. The students are all dressed in black and white, adding to the formal but not somber atmosphere of the commemorative service. Gathered together in the large audience are students in Medicine and Dentistry, Undergraduate and Graduate Science students, as well as the families of the donors, and faculty members and senior administrators of the University.

The students are given the opportunity to express the importance of Anatomy in their training and their gratitude for the learning opportunity provided by the donors. Their testimonials illustrate the often profound, even emotional, place that the subject of Anatomy holds in the minds of medical and other health care students. The observation and dissection of the human body has been a rite of passage for countless generations of medical students, introducing them not only to the structure of the human body but also often to a first confrontation with death itself.

Thus, Julie Hébert , a first year medical student, stood up (in 2011) and expressed her feelings regarding her initial experience at McGill, saying: "Je me souviens toutefois de la première journée au laboratoire d'anatomie. J'ai eu le sentiment qu'enfin, je venais d'entrer en vraie médecine. Ce rêve que j'avais depuis mon enfance était maintenant concret : j'y étais!" ("I remember especially the first day of the anatomy laboratory. I had the feeling that finally, I had just truly entered medicine. This dream which I had since my childhood was now a reality; I was there!").

One of her fellow students, Natacia Anastasio, added the following comment: "The thing that made me the most anxious about medical school was the Anatomy program. I did not know how it would feel or how I would react to the experience. That first day of Anatomy class was one of the most nerve-wracking of my life, but as intimidating as it was, I quickly realized, as we all did, how privileged we were to have the opportunity to learn human anatomy first hand, and all feelings of insecurity and apprehension disappeared. As soon as we entered the Anatomy lab, we all grasped the immensity of what the donors had done for us. They had provided us with our first patient, a patient on which to learn and understand the human body, a patient to explore

and gain experience we would not be able to get otherwise. A patient that will never be forgotten. And for this we are all truly grateful."

George Ross (McGill: 1872-1892) and the New Methods of Physical Examination

During the same era in which Shepherd and Osler were reforming the basic sciences at McGill, George Ross was changing the practice of clinical medicine on the wards. Most importantly, this involved placing an increased emphasis on physical examination [Hanaway 1: 76, 171]. George Ross had graduated from McGill medicine with the Holmes Gold Medal in 1866. He became McGill's Professor of Clinical Medicine in 1872. Not interested in Surgery, Ross was the first McGill faculty member to declare Internal Medicine as his specialty [Hanaway 1: 76, 171].

In the practice of "Traditional Medicine", which had been the rule for all the centuries up to the first half of the 1800's, clinical examination of the patient had been quite cursory. Doctors would only examine the surface of the body, and this consisted of a simple examination of the general appearance of the body, face and tongue, perhaps noting the pulse. Since the popular concepts stressed ridding the body of poisons or bad humors, the doctor might also inspect the urine, stools, sputum, and vomitus. Any further examination was discouraged, being considered an unnecessary invasion of the patient's privacy in this gentile Victorian era [Porter: 119]! This brief examination was accompanied by a meticulous history taking. Diseases were perceived, not in terms of alterations of anatomical structure or physiology, but rather mainly as constellations of the patient's symptoms. The typical consultation concluded with the drawing up of elaborate prescriptions for laxatives [Porter: 128].

In contrast, the new breed of physician who practiced scientific "Hospital Medicine" would not only take a systematic history of the patient but would also perform a complete physical examination. This involved touching and poking, pounding, and listening to consider all the possible diseases the patient might have based on the signs and symptoms observed. This might produce a "differential diagnosis". Further laboratory testing (including light microscopic examination of tissues) might then lead to a "clinical diagnosis" [Porter: 128].

The new type of physical examination looked for signs of disease both externally and in internal organs, and, for the latter, new tools and methodologies were required.

The only internal examination procedure used since Roman antiquity was the use of the vaginal speculum. Other methods of examining the interior of the body slowly became available in the late 1700's. Thus Leopold Auenbrugger published, in 1761, his new technique of examining the chest by percussion, i.e. tapping on the body surface to indicate whether the underlying tissues were air filled (resonant sound), fluid filled (dull sound) or solid (flat sound). The son of an

innkeeper, he may have learned percussion through handling barrels in his father's cellar! Unfortunately, little attention was paid to this technique during Auenbrugger's lifetime [Ack: 134].

In 1817, Laennec introduced the technique of auscultation in France. For this technique, he invented the stethoscope to assess airflow through the trachea and bronchi or to listen to heart sounds [Porter: 173-175]. At first a simple tube, it allowed the physician to hear sounds without intimately approximating his ear to the patient's body, which would have been considered an improper invasion of privacy! With time, the instrument evolved such that a rubber tube system was used to conduct the sound waves to both of the physician's ears. The stethoscope not only provided physicians with an invaluable tool, but became the trademark apparel of all modern clinicians – certainly a more dignified symbol than the medieval urinal [Ack 150!] Canadian doctors were slow to accept its use, but Andrew Holmes reported using a stethoscope at McGill in 1850 [Hanaway 1:39; Hanaway 2:12].

By the 1880's, physical examination of the chest had become quite sophisticated, using auscultation to assess thrills, bruits, murmurs, and rubs, and vocal fremitis. Percussion was used to reveal dullness, often precisely on one side to the level of a single rib [Hanaway 2: 31]. A thorough physical examination also required palpating the patients abdomen, and listening to movements of blood, gas, and air within the major body cavities [Porter: 129]. Expert physicians could detect an entire world of touch and sound, detecting differences in the pulse or palpation of the liver margin, etc. [Porter: 130].

Using the basic techniques of auscultation and percussion, George Ross became an outstanding diagnostician. Another superb McGill clinician was Henri A. Lafleur [Hanaway 1: 230]. After graduating in medicine, Lafleur had joined Sir William Osler at Johns Hopkins in 1889 as his first resident physician. He returned to McGill in 1894 and ultimately became Professor of Medicine. He was a master of physical examination and his diagnostic ability was uncanny. In order to concentrate on his examinations, Lafleur required an absolute minimum of background noise. To achieve this, he even demanded the silencing of the hospital clock as well as the bells of a nearby church on his Sunday rounds [Bensley: 55]!

Other methods of internal examination were also being developed at this time. The field of ophthalmology expanded tremendously with the invention of the ophthalmoscope by Helmholtz in 1851 [Ack: 196]. Similar advancements in laryngology came with the invention of the laryngoscope in 1854 and the bronchoscope in 1898. In urology, the cystoscope was invented in 1876 [Ack: 200]. The digestive tract could be explored from both ends with the introduction of the oesophagoscope and gastroscope, along with the rectoscope [Hae: 272]. At first these were stiff tubes which could cause discomfort or even injury. By the 1970s, longer flexible scopes using fiber optics had been introduced. Thus the whole digestive tract became open to examination, and, using laser technology, surgical treatment as well [Hae: 272]. These high-energy light waves can be

focused to a microscopic point, and they provide sterile "optical knives" that cause minimal bleeding or scarring [Porter 243].

Even more revolutionary was the introduction of laparoscopy, which permitted access of endoscopes to the interior of the peritoneal and pleural cavities through tiny holes in the body wall. This ultimately led to the development of minimally invasive surgery [Hae: 272].

The technique of radiography became available after the discovery of x-rays by William Conrad Roentgen in the 1895, and these permitted dramatic visualization of bones and fractures [Hae: 263]. At McGill, John Cox quickly developed an x-ray machine in the Physics Department, and in 1896, along with medical colleagues, he used this equipment to locate a bullet in a patient's leg. This was one of the first clinical x-rays in Canada [Hanaway 2: 169]. When barium became available about 1910, visualization of soft tissues such as the gastrointestinal tract also became possible [Hanaway 2:34; Ack: 228].

A more recent breakthrough came with the introduction of a new technology in 1972 in which a computer could be used to resolve X-ray beams to produce a cross-sectional picture of the living body. This Computer-assisted Axial Tomography (CAT scanning) allowed a new level of non-invasive examination of internal structures [Porter 243.]. A further development was the introduction of Magnetic Resonance Imaging (MRI) whereby radio waves are used to provide a cross-sectional image [Porter 243]. These two procedures, which allow the visualization of soft as well as hard tissues, have revolutionized medical diagnosis and treatment.

Positron emission topography (PET) scanners measure photons coming from radioactive tracer molecules administered to the patient, and are especially useful for examining local blood flow [Porter 243]. Ultrasound technology was developed around 1955 in Sweden and the USA, and this inexpensive and very non-invasive diagnostic has become ever more widely used [Porter 243].

Far from decreasing the importance of anatomical knowledge for medical treatment, these new techniques have required an increased knowledge, particularly of the internal organs. Since the images provided by many of the techniques (radiography, CAT scanning, MRI, and ultrasound imaging) appear on the computer screen in two dimensions, there has also been a revival of interest of the cross-sectional gross anatomy needed to interpret these sections.

Introduction of Surgical Anaesthesia (1800s)

In the middle years of the 1800's, two giant advances took place over the short period of only a couple of decades that revolutionized the whole discipline of Surgery [Ellis 81; Porter 228.] These was the introduction of surgical anaesthesia and antisepsis.

Without anesthesia or antiseptics, surgery was an agonizing and often fatal procedure. As described earlier in this work, "cutting for stone" (cutting into the perineum to extract bladder stones) was not only hideously painful but more often than not resulted in death from infection. Many patients in the past had chosen certain death rather than undergo the knife, and commonly a sufferer would agree to an operation only after the pain became unbearable. As mentioned previously, surgeons such as George Campbell operating in the pre-anesthesia days had to be fast since the patient suffered incredibly during the operation. It depended on a swift hand, a sharp knife and cool nerve of the operator [Porter: 207]. Since speed was of the essence, complicated surgery was usually not feasible [Ack: 188].

The conditions of surgery were often brutal. An incident typical of the age was recalled by an uncle of William Osler at St Thomas hospital in 1816. "The surgeon had just castrated an Irishman who roared most lustily. His next procedure was the removal of a cyst from the scrotum of a tailor. However the latter, being terrified at the terrible cries of the Irishman, would not get on the table. His trembling appearance kept the whole operating theatre in a roar of laughter. The tailor slunk downstairs to his ward, amidst the hootings of other patients, and the scolds of the nurses" [Bliss3:6].

General anesthesia increased the types of operations to which patients were willing to submit. It also allowed the surgeon to work with less haste and more precision, and decreased the number of deaths from shock. Finally, it attracted excellent surgeons who previously had stayed away from surgery because they could not stand to see their patients suffer. Anesthesia (along with antisepsis) permitted complex pain operations on internal organs never before possible, and knowledge of the detailed anatomy of these internal structures became essential.

The earliest pain killer was consumption of alcohol [Hae: 14, 184]. Attempts had also been made since antiquity to induce general anesthesia using opium and other herbal substances but these had met with only very limited success [Hae:16; 184, Porter:229].

In the western world, the first major advance leading to the development of modern surgical anesthesia came in 1798 when Humphrey Davies discovered the analgesic properties of nitrous oxide ("laughing gas). When mixed with oxygen, this gas produced a reversible state of unconsciousness [Hae: 185; Porter 229; Ellis 81]. An even more powerful anesthetic effect was produced by the fumes the highly volatile liquid, ether. Ether was more difficult to inhale than nitrous oxide (see below), but was more effective [Porter 263]. By the late 1830's, Davy's experiments had become

widely publicized, and wandering lecturers in the United States held "ether frolics" for entertainment purposes [Ack:188, Hae: 186]. Audience members inhaled ether fumes or nitrous oxide and the mind-altering properties of these drugs were demonstrated.

Strangely, little attention was paid at first to the enormous potential value of these drugs for surgery. The first clinical application of this knowledge came when two medical students attended these events and then went on to perform clinical operations. In 1842 William Clarke, a medical student at Berkshire Medical College, used ether to anesthetize a patient for a dental extraction [Hae: 188]. In 1846, William Morton, a dentist, did the same thing [Porter 229.] Two weeks later, in the Massachusetts General Hospital, Morton gave the first public demonstration of general anesthesia to facilitate removal of a neck tumor by a hospital surgeon, John Collins Warren [Ack: 189 Ellis 82]. At the end of the successful operation, Warren declared that "this is no humbug". The site of this famous operation is preserved at the Massachusetts General Hospital as "the Ether Dome" [Ellis: 83]. News of the event spread rapidly, and the first use of ether anesthesia at the Montreal General Hospital was in 1847 [Hanaway 1:45].

In 1847, James Simpson in Edinburgh used chloroform, another highly volatile liquid whose fumes were a potent anesthetic, to relieve the pain of childbirth [Ellis: 88]. It soon began to be used extensively for this purpose, even for Queen Victoria [Porter: 229; Hae: 190]. Chloroform was the easiest drug to give but was more hazardous [Porter 263]. Sometimes chloroform produced serious cardiac problems, and its use was gradually phased out by 1920.

At first, the ether or chloroform was administered by untrained medical students or surgical residents in the operating room, even though they had no detailed knowledge about these highly toxic substances [Hanaway 2:160]. The liquids were administered by the "open drop" method in which a cone with gauze stretched over a metal frame was held over the patient's nose and mouth, and drops were put on the gauze. The patient inhaled the fumes while also breathing room air [Han2:160]. Ether was often was very irritating to the throat and trachea, and the retching patient frequently had to be tied down [Hanaway 2:160]. In1911, endotracheal anesthesia was introduced to alleviate the situation [Hanaway 2:161].

Thomas George Roddick (McGill: 1874-1923) and Antiseptic Surgery (2nd half of 1800s)

As important an innovation as anesthesia was, an even greater milestone in the history of surgical treatment was the introduction of antiseptic surgical techniques.

In the pre-antiseptic era, most patients who had major operations died from infection. The terrible fear of surgery, especially of the internal organs, was justified since, in addition to the pain, it was acknowledged that even a "successful" operation more often than not ended in fatal

septicemia. This was especially true if the surgery carried out in hospitals. Just going to a hospital was something that everyone should avoid if at all possible since the average medical patient would die of "hospital fever" (typhus) while the surgical patient would succumb to "hospital gangrene" [Ack 187].

This was particularly true in the case of internal operations. When laparotomies were occasionally done to access internal organs (as for intestinal obstruction and appendicitis), the patient usually died [Ack: 186].

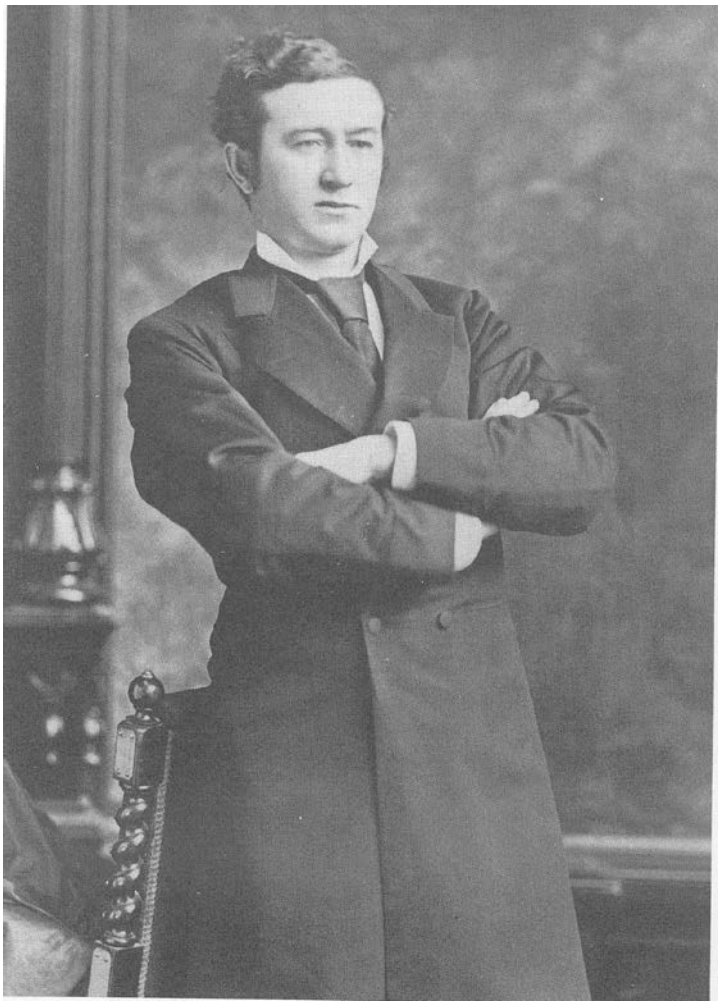
In this era, there was no appreciation of the existence of infection. The medical community on the whole did not believe in the possibility of transmission of diseases by unseen organisms. The first dramatic evidence that infection could be transmitted over distances began with a study carried out by an obscure Hungarian obstetrician, Ignaz Semmelweis. He noticed in 1847 that in a local obstetric clinic run by midwives, the mortality rate from puerperal fever (childbirth infection) was quite low (2%) However in a second clinic in the same hospital run by doctors and their medical students, the mortality rate was much higher (18%) [Hae: 204; Ellis: 89; Porter: 229]. When the doctors and students in this second clinic were persuaded to thoroughly wash their hands with soap and chlorinated water before treatment the mortality rate was reduced to only 1%! This dramatic evidence strongly indicated that some kind of infection was being transmitted to the second clinic via the contaminated hands of the doctors and medical students coming from the hospital autopsy room. He therefore postulated that the infectious disease was being transmitted from one location to another via invisible germs.

Unfortunately Semmelweis and his findings were completely ignored by the medical establishment at the time. Dejected by the continuing needless loss of mothers' lives and what he considered the stupidity of his colleagues, he succumbed to depression and mental illness and finally died in an insane asylum (ironically from sepsis) in 1865 at the age of only forty-seven [Ack: 187-188; Ellis 90; Hae:205].

In the same year (1865), the Scottish surgeon, Joseph Lister, became impressed by the difference in mortality rate between simple and complicated fractures. In the latter fractures, which communicated with the outside air, the mortality was much higher than in simple closed fractures. By this time, Louis Pasteur had recently shown that bacteria existed everywhere in the air [Hae: 206; Ellis: 91], and Lister perceived that these bacteria might be entering the wound to cause infection. In an innovative approach, Lister used carbolic acid during surgical operations to kill these germs [Ack: 191; Porter:231; Ellis 91; Hae:209.] As with Semmelweiss, Lister's work was initially met with hostility and derision amongst many members of the medical profession.

In 1872, Lister gave a demonstration at the Royal Infirmary in Edinburgh. This demonstration was attended by one of McGill's most outstanding medical graduates, Thomas George Roddick, who

was very impressed by Lister's evidence [Hanaway 1:82; Ben:35.]. Born in Newfoundland, Roddick had graduated from McGill with the Holmes Gold Medal in 1868 and was appointed house surgeon (surgical resident) at the Montreal General Hospital [Frost 2:51].

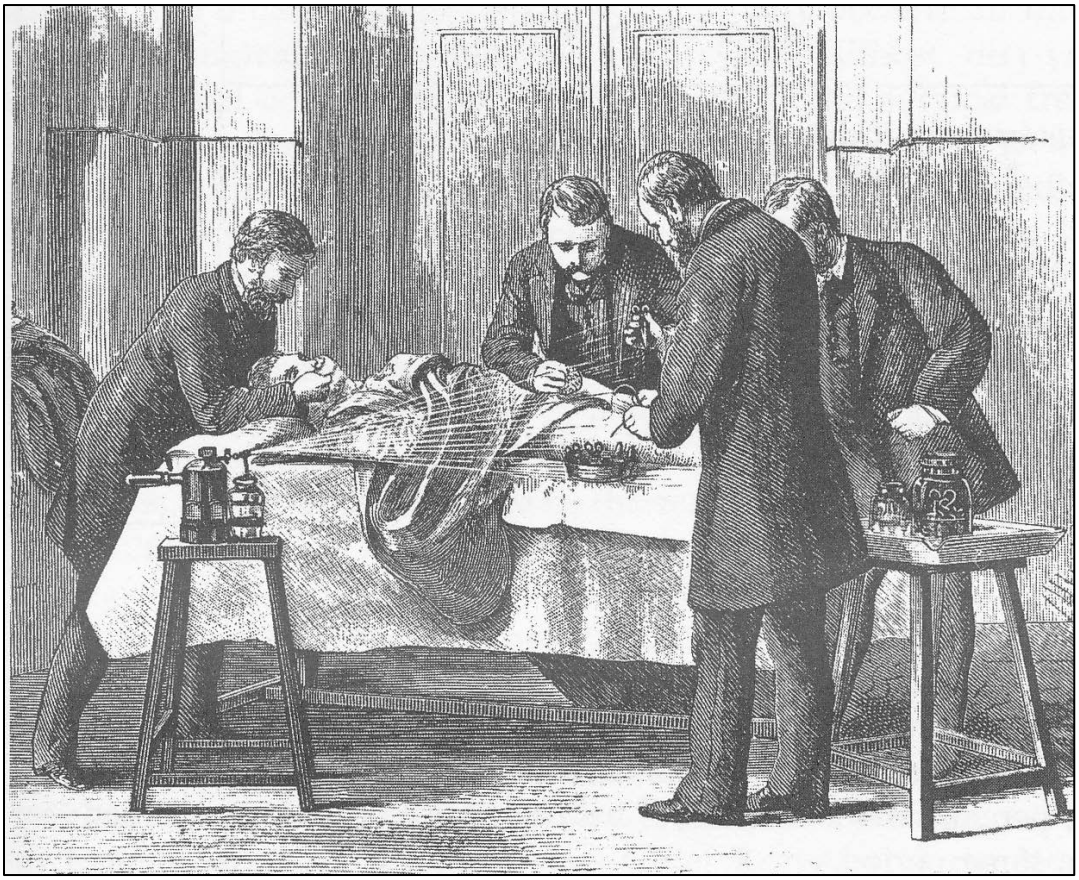


Thomas George Roddick in 1880

Upon his return to Montreal, Roddick became Demonstrator of Anatomy at McGill in 1874 and then Professor of Clinical Surgery in 1975. At McGill, Lister's procedure of using carbolic acid for antiseptic surgery had been tried out by Robert Craik and William Fraser in 1869 [Hanaway1:81, 167]. Their surgical results were not impressive, however, perhaps because they did not follow Lister's spray technique.

Upon beginning his surgical practice at the Montreal General Hospital, Roddick initially operated without antiseptic surgery, leading to a very high operative infection rate, This led him to return to Scotland and then London in order to examine Lister's work more closely [Hanaway 1:82.] He came back to Montreal with a complete antiseptic outfit including a spray apparatus. In his subsequent

surgical procedures, the operating area was covered with a towel soaked in 1:20 carbolic acid solution. Sponges, instruments, and catgut were placed in the same solution, and the hands of the doctors and nurses were washed in 1:40 solution. The spray apparatus was a boiler tank heated by an alcohol flame to produce steam which carried carbolic acid drawn out of an attached bottle. Throughout the operation, this spray saturated everything: walls, ceilings, floors bedding, as well as the patients, doctors and nurses [Hanaway 2: 83]! The operating room itself was also changed dramatically, with the blood-stained wooden table and walls being replaced by a clean metal table and glass and tile walls. The crusted frock coats were replaced by white gowns.



Operation with Carbolic Spray used for Antisepsis - 1882

Roddick reported his dramatic results in 1878-79 [Hanaway 1:85]. Prior to antisepsis in 1877, ten thigh and leg amputations had resulted in an 80% mortality rate from infection. During the two year period following antisepsis, in 62 major operations, the mortality rate was only 3.12%. With Lister's technique, the days of infection had come to an end [Ack:191.] From now on, many operations could be carried out that were previously impossible, e.g. abdominal bowel surgery and hysterectomy, procedures which prior to 1877 had meant almost certain death [Hanaway 1:86]. Surgical procedures began to extend into the thorax and head. In 1884, Francis Shepherd

performed his first successful thyroid operation, and in 1885 he was the first surgeon in Canada to successfully remove a kidney [Hanaway 2:171].

Lister's antiseptic carbolic spray technique, while effective, was disliked by users who became saturated by the spray [Porter: 230]. Doctors and nurses frequently developed dermatitis from the carbolic acid and occasionally nephritis from its inhalation [Hanaway 1: 84]. By the 1880's, this antiseptic technique was increasingly being replaced by the aseptic technique in which the operating theatre, instruments, and surgeons hands were kept meticulously clean and freed from bacteria by disinfection with steam or other methods [Hae: 212, Ellis: 96]. Additional protection came with the introduction of face masks, surgical gowns, and rubber surgical gloves. The latter were introduced in 1890 by the American surgeon William Halsted at Johns Hopkins Hospital. Ironically, these were initially used not for asepsis but to protect Halsted's nurse (and fiancée) whose hands were allergic to the antiseptic solution [Ellis 96; Hae:214; Porter: 230].

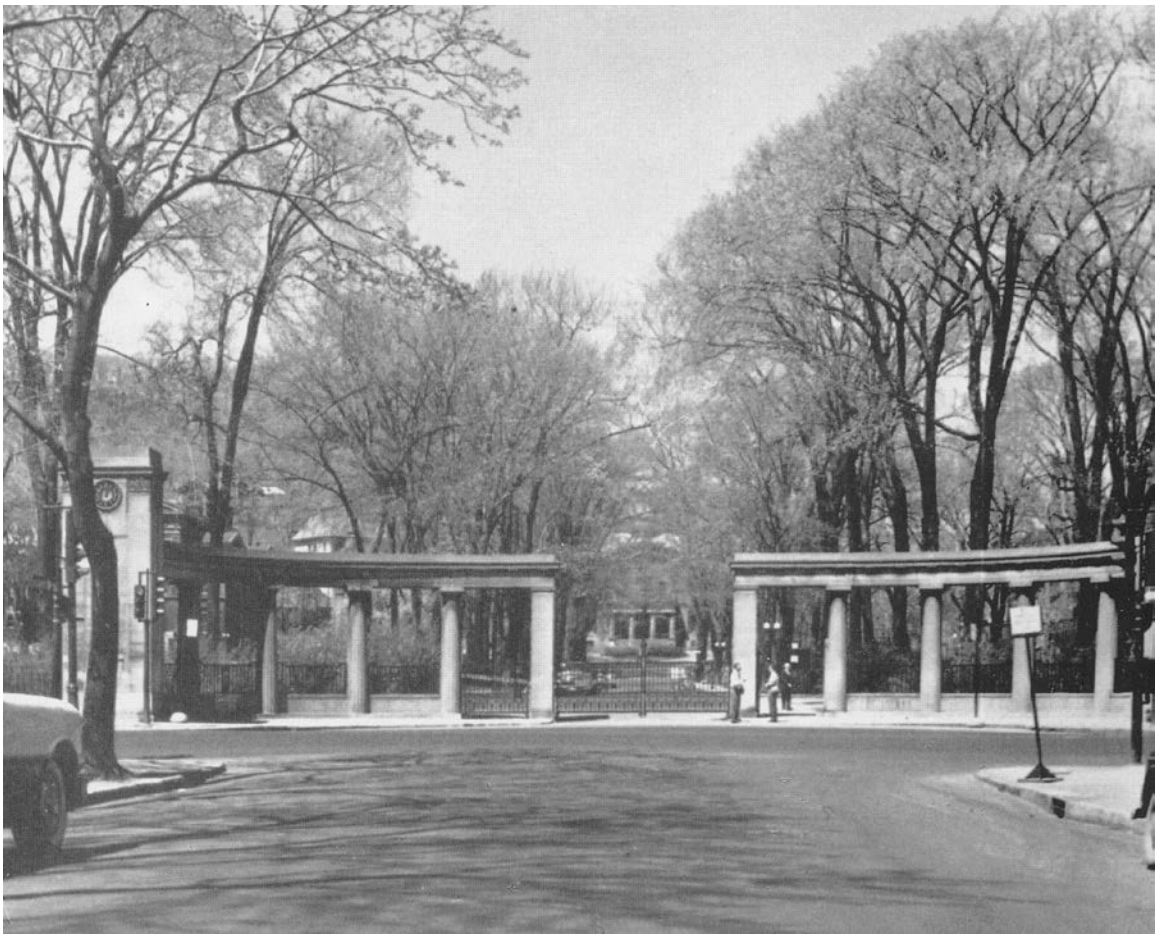
Uniform operating room standards were established and procedures were taken out of the hands of individual surgeons [Hanaway 2: 171]. The time had finally come when, after centuries of hospital gangrene, a patient could now hope to enter a surgical ward with the hope of leaving alive [Ack:191].

These changes in surgical practice had a dramatic effect on the teaching of gross anatomy. Whereas in the past, students had not needed to know the detailed anatomy of internal organs, this knowledge now became mandatory.

The increased importance of surgical treatment also led to the first separation of medical and surgical practices at McGill in 1892. In the new world of specialization, Thomas Roddick limited his practice to surgery and George Ross his to medicine [Hanaway 2: 171]. By the end of the First World War, doctors practicing both medicine and surgery had disappeared from McGill's teaching hospitals [Han2:171].

<u>The Roddick Memorial Gates</u>

One of Roddick's characteristics was his emphasis on punctuality, and he always began his lectures exactly on time. He and his wife, Lady Amy Redpath Roddick, discussed the need for a central clock on campus to serve as a guide for students. After his death in 1924, his wife donated money to construct two impressive formal gates and a clock tower at the Sherbrooke Street entrance to McGill [Hanaway 2:129 ; Frost 2:123]. A plaque may be found on the side of one of the pillars.



Roddick Memorial Gates at Entrance to McGill University, 1925

The clock in Roddick's tower has faces on three sides, and chimes every hour, day and night. Hanaway 2: 132. For many years these chimes had ceased to function but recently they have been repaired and connected via satellite to a national time signal.

These gates, designed with a Greek motif, form part of a linear vista which extends all the way from Montreal's downtown Place Ville Marie to the Greek portico of the Arts Building (seen in the middle of the photograph). It is particularly enchanting when decorated by lights during the winter holiday season, and could be considered Montreal's version of the Champs Elysées and Tuileries in Paris!

Unfortunately, very few McGill students or faculty members realize that these Roddick gates commemorate one of our famous medical graduates or know of the important role he played in the history of McGill.

Bishop's Medical School (1871-1904)

Another Quebec institution whose history is intertwined with McGill in terms of medicine and dentistry is, surprisingly, Bishops University!

In 1871, the McGill Medical School found itself facing another rival medical school in Montreal. This school was founded by Francis Weyland Campbell who had graduated from McGill Medicine in 1860 [Hanaway 2:60]. Campbell had wanted a position on the McGill faculty and, when this was not available, he joined with a number of other Montreal physicians in founding a rival school [Frost 2: 44]. To be accredited, however, this school needed a university connection, and it turned to the small English-speaking Bishop's University which was located in Lennoxville in the Eastern Townships. The Bishop's Medical School, however, operated entirely in Montreal, and the Bishop's students were permitted to do their clinical rotations at the Montreal General Hospital. As expected, relations between the two schools were never particularly friendly [Frost 2:44]. When Francis Weyland Campbell died in 1904, the school had an enrollment of 50 students, but lacked adequate facilities to carry on an efficient medical education. At this time, the Bishop's Medical School proposed amalgamation with McGill's Faculty of Medicine. After a period of negotiations, this was carried out. All the previous 246 graduates of Bishop's Medical School (including Maude Abbott) then became eligible to apply for McGill's M.D., C.M. degree "ad eundem" [Hanaway 2: 60-62].

The Faculty of Dentistry (1904 – Present)

As mentioned previously, in past eras, the practice of dentistry, along with surgery, commanded less respect than medicine. Itinerant tooth pullers offered the only remedy for most dental ailments [Knight: 68].

With time, most dentists came to be trained by the apprenticeship system. In Canada in 1868, most dental practitioners were either self-taught, trained in an apprenticeship system, or trained elsewhere [Frost 2:45]. In 1892, the Dental College of Quebec was founded, and to obtain accreditation the organizers sought affiliation with McGill [Han2:51]. McGill agreed to accept the dental college as part of their Faculty of Medicine but they would only award a diploma to the dental graduates. Unsatisfied with this arrangement, the Dental College affiliated itself in 1896 with the Bishops University Medical School which was willing to award a degree. Thus Bishop's University awarded the first D.D.S. degree in Canada in that same year [Frost 2:45].

In 1904, when the Bishop's Medical School merged with the McGill Medical School (see above), its Dental College came along in the bargain, becoming a Dental Department within the McGill Medical School [Hanaway 2:52]. One change in the new Dental Department was the language of instruction. Teaching at the Bishops Dental School had been bilingual. Upon merger with McGill, the three francophone professors resigned and formed the nucleus of a new francophone dental school which joined the Université Laval à Montréal [Frost 2:47].

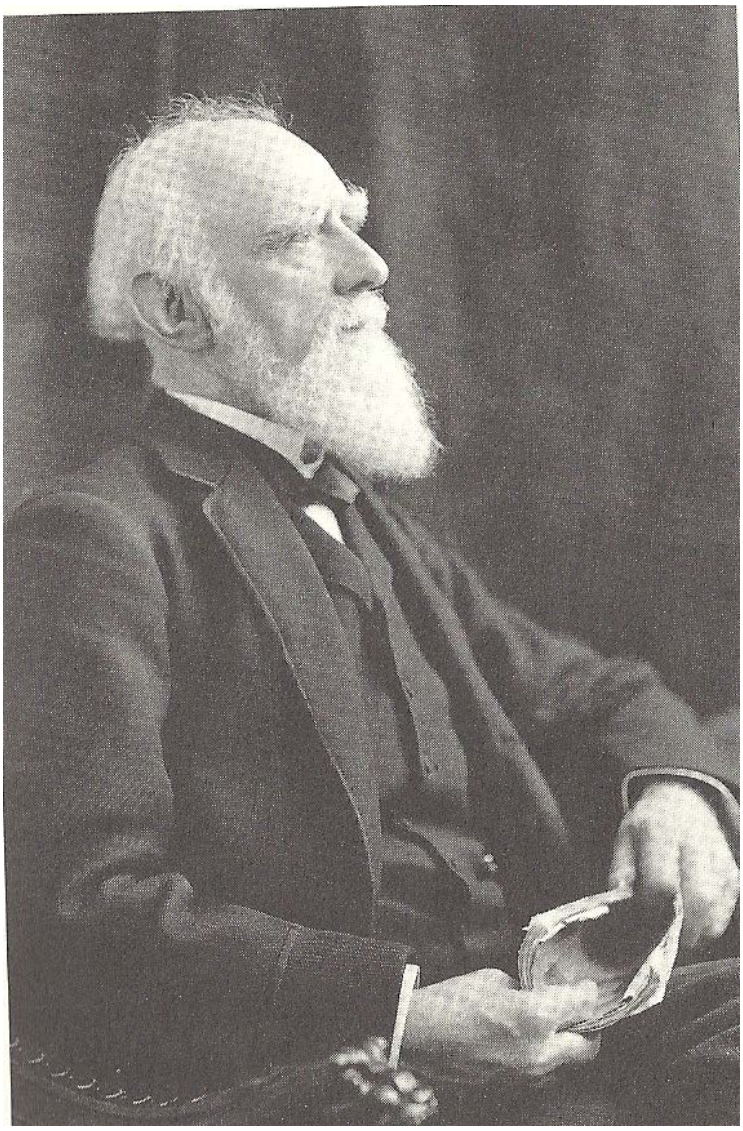
At McGill, Dentistry became a separate Faculty in 1920 [Han2:53]. The class had increased from ten students in 1913 to thirty in 1922 [Frost 2:169]. During its separate existence, the Bishop's Dental School had graduated 86 students. It had also accepted female students, and at least one woman, Georgina Mc Bain had graduated with a D.D.S. in 1903. Within McGill, however, the Dental School denied admission to female students for several more years [Frost 2:47; Hanaway 2:53]. The reason for this lay with same prejudices against women as had existed in the Medical School. In Dentistry, it was felt that the "gentle sex" would be too weak for dental procedures such as extracting molar teeth. Finally, in 1922, the Faculty of Dentistry admitted its first women student, Florence Johnston, who graduated in 1926 [Frost 2:169]. Strength was not a problem for Miss Johnston who was six foot tall and weighed over 200 pounds!

As in Medicine, the Dentistry classes contained very few women during these early years, e.g. 0% in 1928, 1.7% in 1938, 0.7% in 1948, 4.2% in 1958, 5.4% in 1968, and 11.4% in 1978 [G2:316.] Until the Second World war, there were never two women in the same class [Frost 2:169]. One of the Dental School's most outstanding students was Roberta P. Dundass Berster who won the gold medal for three consecutive years. She graduated in 1957 at the head of her class of twenty-five, all men except herself! Having won the Montreal Dental Club prize, she interned at the Gugenheim Foundation in New York, did a M.Sc. in Periodontics in Michigan, and returned to practice dentistry with her two brothers in Montreal. When asked whether women were strong enough to extract teeth, she dismissed the stereotype, saying "It's not at all a question of brute strength. Extractions, when performed properly are simply a matter of technique" [G2:317].

For most of its history, the McGill Dental School gave its own courses in basic science courses such as Anatomy and Physiology. Histology was taken along with the medical students. When the school was threatened with closure in recent years, an arrangement was made whereby the dental students took the same curriculum with students in the Faculty of Medicine during the first one and one third years (i.e. the Basis of Medicine portion of the Medical Curriculum). It may be noted that in many European medical schools, Dentistry is a subspecialty within the Medical Curriculum, and all dentists therefore have medical degrees [Knight:69].

Lord Strathcona (1820-1914)

One of the chief benefactors of McGill's Medical School and indeed of the whole university is acknowledged to be Donald A. Smith (who became Lord Strathcona).



Donald Smith (Lord Strathcona) in 1895

One of the giants of Canadian history [Frost 1:253], and destined to become one of its richest men, Donald Smith was born in 1820 to a poor family in Scotland. He immigrated to British North America as a young man, arriving in Montreal in 1838 [Newman3: 4]. Like James McGill before him, Smith started out as a fur trader. He joined the Hudson's Bay Company as an apprentice-clerk, counting muskrat skins in a Montreal warehouse. Subsequently, he suddenly left Montreal under

mysterious circumstances. According to one version, Smith had developed a social relationship with the young wife of the governor of the Hudson's Bay Company, the august Sir George Simpson, who spent most of his time away on inspection tours. His employer, a very difficult man, regarded this behavior as impertinent. Short of being dismissed, Smith was banished, first to Tadoussac, and then to one of the remote outposts of the company at the very northern tip of Labrador.

In this incredibly cold climate, the beavers grew thick dense fur coats, which had prime value. This was therefore an important post for the fur trade. Over the next thirty years, Smith survived and succeeded in establishing himself as a successful company trader. He was finally permitted to return to Montreal, relatively late in life at the age of forty-nine, and began his amazing financial career [Frost1:253].

During his thirty year isolation, Smith had saved every penny of his salary and invested it in shares of the Bank of Montreal, making him already a major stock holder upon his arrival. In the following decades, he became president of the Bank of Montreal, making it Canada's most profitable and North America's safest financial institution. Smith transformed the Hudson's Bay Company from a haphazardly linked collection of wilderness outposts into an extremely profitable commercial enterprise. He had an ability to look into the future and realized that the company must evolve from trading pelts to real estate (he saw the agricultural potential of western Canada), transportation and retailing. In his career, by sheer ability and force of character, he staged a dazzling sequence of commercial and political coups that made him the most powerful Canadian of his day [Frost 1:253].

In his most daring and successful railroading venture, Smith, along with his cousin George Stevens and two other partners, borrowed two hundred and fifty thousand dollars and invested it in the bankrupt St. Paul, Minneapolis and Manitoba Railway. After ten years of stock manipulation, insider trading (which he practically invented) and minimal improvements, its value increased to a cool sixty million dollars [Newman3: 4, 109]. With this money, Smith and Stevens became the principal financiers of the trans-continental Canadian Pacific Railway, and essential element for Canada's development in the west. Although Stevens was head of the C.P.R. and William Van Horne its builder, it was Smith who repeatedly provided the crucial money to keep the railway going during the many turbulent and difficult years of its construction [Newman3: 124]. Smith preferred to keep out of the lime light and to dominate events from behind the scenes. Thus he was never well known to the Canadian public [Newman3: 4]. Only one famous picture of Smith exists, awkwardly driving the last spike at the completion of the Canadian Pacific Railway at a small town in the Canadian Rocky mountains. This picture is included in all Canadian passports!

During his lifetime, Smith won every available public honor, including two university chancellorships (including McGill), the close confidence of four Canadian prime ministers (all of

whom he betrayed), membership in the Canadian Parliament, the friendship of two British Monarchs, a seat in the House of Lords, and a British knighthood [Newman3: 4]. Finally he became a baron with the impressive title of "Lord Strathcona of Glencoe County. Argyll, Scotland, and of Mount Royal, Quebec, Canada"). An unabashed Imperialist and lover of the British Empire, Smith also obtained Canada's most important diplomatic appointment to Britain, the High Commissioner to the Court of Saint James. This fulfilled his lifelong dream of reveling in the imperial establishment and the highest levels of British society, He rapidly became London's favorite colonial character [Newman3: 134].

Smith was noted for his longevity, and he never retired. His work ethic was: "To rest is to rust." During the year 1905, at the age of 85, he was Governor of the Hudson's Bay Company, President of the Bank of Montreal, Director of the Canadian Pacific Railway, President of the Royal Trust, Canada's High Commissioner to Britain, and Chairman of Burma Oil as well as the Anglo-Persian Oil Company (the future British Petroeum)! In his never-ending quest for wealth and power, his morality was "God helps those who help themselves" [Newman3: 4].

As described by Peter C. Newman: "The key to understanding Donald Smith is the Scottishness of the man – Scottish to the marrow of his soul, despite his English airs and Canadian domicile. Like all good Scots, he knew how to maximize the authority of pursed lips and disapproving glances, how to parlay endurance into salvation, and, above all, how to fight. Scotsmen like Smith embraced the burden of hard work as Calvanism's earthly path to salvation" [Newman3: 12-13].

Perceptions of Donald Smith ranged across a whole spectrum depending on those who interacted with him. In the business world, he "may have been the most intriguing rogue in Canadian history… certainly, the most successful" [Newman3: 15]. In the political world, an opponent wrote that "the Smith syndicate was entirely responsible for using the Canadian Parliament for the most improper purposes that ever became operative in a free society" [Newman-Princes: 4]. Among those who benefited from his generosity, the vice-chancellor of Queen's University stated: "I am grateful to God for the large service he has enabled Lord Strathcona to render for Canada". Sir William Peterson, principal of McGill, stated that "Duty was Lord Strathcona's guiding star" and that "Canada can boast of him as a man of unspotted integrity".

Smith himself wished to be remembered as a man who had never sinned and indeed had been intrinsically incapable of sinning. [Newman3: 8]. Convinced that it was a sin for a Scot to die rich, he became one of the most generous and creative philanthropists of his age. After a period of incredible generosity to McGill University and the Royal Victoria Hospital, Lord Strathcona died in 1914 at the age of 94. (note: see D. McDonald: Lord Strathcona: A biography of Donald Smith, 447-9)

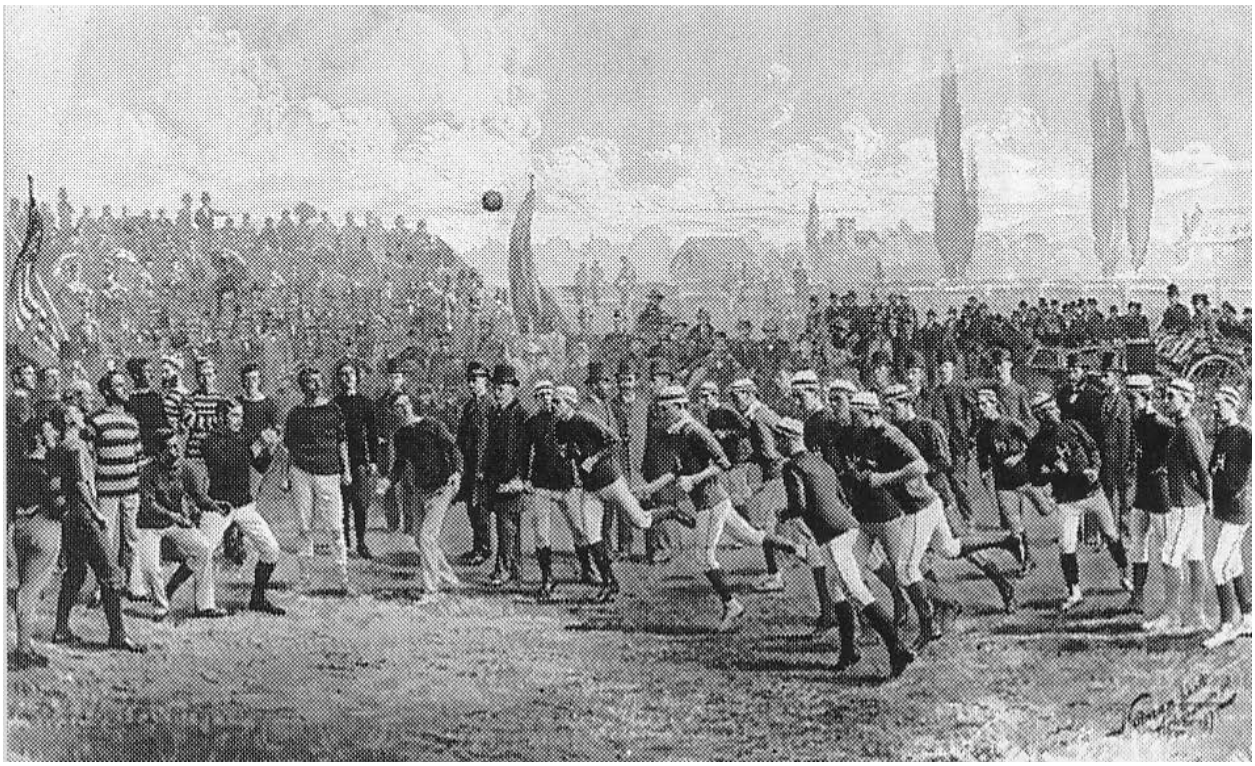
Curriculum, Student Numbers and Life (1870s – early 1900s)

In 1872 there were 154 students in the four years of the Faculty of Medicine program. There were 232 students by 1884, and over 467 by 1901 [Hanaway 2:2, 46]. By 1901, the student body had also become more cosmopolitan, with 32% of the students from Ontario, 29% from Quebec, 10.5% from New Brunswick, 9.5% from U.S., 6% from Nova Scotia, 5.5% from P.E.I., 2.5% from B.C., 2% from Newfoundland, and occasional students from Manitoba, West Indies, Great Britain and Ireland, China and Japan [Hanaway 2:46]. American students always studied in great numbers at McGill's many faculties, making it somewhat different from other Canadian schools [Hanaway 2:202]. Students paid an annual tuition fee of $100 plus a graduation fee and hospital fees. A professor's salary ranged from $2,400 to $3,600 [Hanaway 2:47]. Interest, space and funds for research were inadequate, partly because McGill had placed its priorities on development of student laboratory facilities [Hanaway 2:48].

In the medical school curriculum, it was perceived that there were still too many lectures, a complaint that has persisted to the present day (at least in the eyes of external accreditation committees)! Anatomy and Histology, however, always had a higher percentage of laboratory time than other subjects. In Gross Anatomy, only one third of the total hours were spent in the lecture room. Osler and Shepherd were both of the opinion that practical exposure was the best way for students to learn these visual disciplines [Hanaway 2:47].

A visit to Harvard by Osler, Shepherd and Ross in 1877 revealed interesting comparisons with the situation at McGill [Hanaway 1:77]. The Harvard school year ran for nine months of the year (September to June) as compared to six months at McGill. However Harvard required only three years to graduate while McGill required four. In 1894, McGill extended the yearly academic term from six to nine months. This four year program still included two years of Anatomy, one year of Histology, and one year of Aurgical Anatomy [Hanaway 2:7, 9].

In 1897, the first of the Old McGill annuals appeared, and revealed that the mood of students was somewhat more adolescent and frivolous than in previous times. Football contests with Toronto, Yale, and Princeton loomed large and there was a McGill yell for such occasions. College "rags" often led to hooliganism, and Theatre Night was the great event of the year [Frost 2:19].



Football game between McGill and Harvard in 1874

In the 1890's, the majority of students lived at home and their fathers were mostly professional men, successful merchants or upper level tradesmen [Frost 1:288]. Most out-of-town students lived in boarding houses east of campus, paying $14 a month for room and board. Most streets were made of packed earth and were muddy in spring, and very dusty in the summer. They were not plowed in winter, and the snow banks rose to six feet [Hanaway 2:16]. Students often still had to walk from the campus to the downtown Montreal General Hospital for their clinical experience.

At the commencement of the First World War in 1914, the student body at McGill was still a compact and homogenious group of young men and women, mostly of anglophone, protestant stock of British origin [Frost 2:125]. In the province of Quebec, the francophone population was increasing more rapidly than the Anglophone. What really affected McGill's student body, however, was the rapidly increase in European immigration, whose children were applying to the university in considerable numbers. Many of these were Jewish, and in the early post-war years the number of Jewish students rose to 25% in the Faculty of Arts, 15% in Medicine and 40% in Law. McGill did not feel ready for such a sudden change and measures were taken in the late 1920's and 1930's to control the influx of Jewish students. In Arts, the Jewish students had to satisfy higher admission standards. In Law and Medicine, there was a quota system. In Medicine this quota aimed at 10%, although it was not strictly enforced. During the Second World War, university registration allowed deferment of the military draft, which had very serious

implications. At this time, the Jewish community made representations to the University about unfairness, and these restrictive admission practices were ended. They have not been reinstituted since that time [Frost 2:128].

The final examination papers in the subjects of Anatomy, Histology and Embryology in 1900 are presented below. It may be noted that Harvard had written exams while those at McGill were mostly oral. At Harvard, students had to pass final exams every year while at McGill, final exams occurred only at the end of the second and fourth year.

Final Examination Papers in 1900

Examination Paper in Anatomy (in 2nd year) [Hanaway 2:262]

1. Describe the dissection necessary to expose the stylopharyngeus muscle.
2. Describe the solid viscera in relation with the left kidney.
3. Describe the insertion, nerve supply and actions of the muscles attached to the fibula.
4. Trace the various constituents of the spermatic cord from their origins to termination.
5. Describe the optic tract and chiasm. How does the optic nerve terminate?
6. Name in order the parts it is necessary to remove in order to expose the right pulmonary artery.

Examination Paper in Histology (in 2nd year) [Hanaway 2:262]

Describe a serous gland. Mention where some typical examples are found.

1. Describe a section of pancreas.
2. Describe a section through the cervix uteri of an adult at the junction of the vagina.
3. Describe a section through the eyeball made from before directly backwards.
4. Write fully on blood cells (this was part of the Physiology exam).

Examination Questions in Embryology (In Physiology Exam in 2nd year)

1. Explain the meaning of the following: blastoderm, germ layers, cleavage of the mesoblast, spanchopleure, chorion, amnion, optic vesicle, gut, medullary folds.
2. Explain briefly the meaning of the following: allantois, placental villi, decidna reflexa, corpus luteum,

The Flexner Report (1909)

By the 1880's, droves of Canadian and American medical students, like Osler and Shepherd, were studying in German universities to obtain clinical and laboratory experience [Porter 182]. Students returning from postgraduate training in Europe proposed the view that medical education in

America should have a stronger scientific orientation, and that laboratory training was essential [Han 2:xvii].

This new spirit was first adopted by the newly-founded Johns Hopkins School in Baltimore, where the emphasis was on advanced teaching and research. Most American and Canadian schools, however, remained under the influence of the British and Scottish Universities where facilities for medical research remained small and underfunded since British medicine was mainly practical and geared to private practice [Porter 182].

As mentioned previously, the quality of many American medical schools had actually decreased during the 1800's due to lack of state standards and increased demands for doctors. In 1908, concerned with the reputation of many American medical schools as "diploma mills", the American Medical Association urged the Carnegie Foundation to invite Abraham Flexner to write a report on the state of North American medical schools. Flexner, a Louisville school teacher, had gone to Germany to study their graduate programs and had written a critical book on American education. An enthusiastic supporter of the Germanic model developing at Johns Hopkins, Flexner concluded that there were only five American institutions that were true centers of medical research: Harvard, Johns Hopkins, and the Universities of Pennsylvania, Chicago, and Michigan [Porter 196].

Using the Johns Hopkins program as a model, Flexner surveyed 155 medical schools and published his report in 1910. This extremely influential report produced prolonged debate and resulted in the closure of some seventy medical schools.

By the time Flexner visited McGill in 1909, the medical school had begun to emphasize the development of student laboratory teaching facilities in the disciplines of Chemistry, Physiology, Pharmacology and Pathology. Thus he found a partially burned medical building, but an energetic, scientifically oriented staff with ten of the nineteen professors being full time. There was ample tuition, good financial management, a large library, and ample hospital beds in two teaching hospitals. In the basic sciences there were excellent student laboratories, not only in Anatomy and Histology, but also in Physiology, Biochemistry, Pharmacology, and Pathology. Finally a magnificent new Medical Building was coming into existence. Flexner therefore gave McGill an A-minus rating, one of the highest [Hanaway 2: xviii, 48, 76-79].