Reflections on Aspects of Medical Progress 1944-2008 - Part 1

The Launch of a Journey Lasting 65 Years: Personal Observations Made From a Front-Row Seat at the Greatest Show on Earth

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I arrived in this world 86 years ago in what is now a notorious brothel in Newcastle-on –Tyne. With my three siblings and parents I entered Canada through Quebec City on a small freighter on May 25, 1925. I have a vivid imprint of the dockside and the tedious wait, not unusual for immigrant arrivals. By a fluke of chance on May 25, 50 years later, I stood on the same busy dock in Lower Quebec and it seemed remarkably like my old memory. February 2008 marks the 64th year since I attended my final lecture in the University of Toronto Medical School. A request was made of me to think back over some of the events of these 64 years. My reminiscences will be divided in this first part to events leading to my arrival at medical school and my first 25 years after graduation, including a synopsis of evolving great moments in medicine of which I was an observer. The second part will concentrate on the research areas in which I have had the privilege of contributing and collaborating, with particular reference to stroke and its prevention.

Australia's illustrious stroke neurologist Graham Hankey recounted to me the reason that he chose medicine. His physician father had said to him: "Son, life is the greatest show on earth and if you work hard at being a doctor you will be sure of a front-row seat". He was correct and both of us have watched and worked from positions of advantage and privilege.

As a young boy of 12, I skipped Sunday school (I suppose in mild defiance of my Anglican clergyman father). It was a mid-February day, and I walked to Ashbridge's Bay, historically a large and famous Toronto waterfront marsh hunted by professionals to supply ducks, geese, swans, quail and snipe to the Toronto markets. I fantasize that a few of the now extinct hordes of Passenger Pigeons and Eskimo Curlew would be thrown in for the ovens of York's housewives. By 1934 the 35 acre area was partly marsh and partly sewage disposal. That Sunday morning at the north-east edge of the marsh I encountered two young men looking through binoculars. I bespoke immediate curiosity about their obvious excitement: one handed me his binoculars and I was looking at a mixed flock of two species of High Arctic winter wanderers, Common and Hoary Redpolls. One breeds on Baffin Island, one in Siberia. Both are elegant little creatures. the existence of neither of them before known to me. Pretty exciting and stimulating stuff. Much more was to follow. They invited me to circle the whole marsh with them. We saw other things that I scarcely knew and then mostly from children's storybooks such as a Great Horned Owl on a huge nest of sticks in a willow tree; a Northern Shrike ("Butcher Bird", no bigger than a robin) filling his larder on the long spikes of a hawthorn tree: his reserve of meat in the form of impaled mice. And to cap off the afternoon I marveled as three snow-white Tundra Swans flew west just off the lakeshore. My companions said they had begun their annual northern trip from Chesapeake Bay to Canada's Arctic tundra. Sunday school diet was tame compared to the unfolding of these secrets. Jim Baillie to whom the first binoculars belonged, was slated to become one of North America's most famous field ornithologists and to be a fast friend to me for the rest of his life. From him I absorbed the importance of biological curiosity and especially absolute accuracy of any and every observation to be written into the record. In his Royal Ontario Museum office I met such experts in his world as Roger Tory Peterson, Murray Spiers, P.A. Taverner, Farley Mowat and the late Jack Livingstone, (the initiator of Canadian Broadcasting Corporation (CBC) "The Nature of Things" and CEO of the Canadian Audubon Society), and Fred Bodsworth (author of the still best-selling novel "The Last of the Curlews"). To make use of my fiery urge to learn more about the natural world I thought seriously of a career in biology. My father, a former missionary in West Africa and now a struggling Anglican priest in Toronto, opined that a degree in ornithology was pretty frivolous; he could foresee few jobs and said he would try to help me if I chose Medicine. This I did but got through my teen years with my burning curiosity for nature intact, little interest in sports and remain as keen or not respectively for both at age 86 as at 12. Even as I write I am looking out my country-house window at 20 Common Redpolls,

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Figure 1: *Kathleen and Henry Barnett in Happy Valley Forest, King Township: Spring 1966*

3 White-tailed deer and 2 raccoons on or under my bird-feeder. Last evening a noisy pack of coyotes, who den in my forest took down a large doe half a mile away and demolished it. Toronto's waterfront is only 30 miles away and 3 million people live south of where I am. The glaciers melted here 10,000 years ago and left rolling hills and steep defiles unsuitable to farming. I have signed legal documents that will assure the persistence, intact, of the Happy Valley Forest for another millennium.

I entered medical school at the University of Toronto at age 17, with only ten years of secondary education behind me. At the start of what should have been my school years we lived in the remote suburbs of the growing city of Toronto. There was a scarcity of desks at Birch Cliff Public School so that I was taught reading, writing and arithmetic by a dedicated mother. In those days an undergraduate degree was not an essential to entry into medical school. On leaving high school I entered medicine with 12 of my class-mates. The war against the tyrants Hitler and Stalin began one week prior to our first medical year.

Hankey's father was correct in his prediction: good seats for one of life's greatest shows were now booked. My first encounter with greatness was in second year medicine. A large man strode into our lecture hall to introduce us to Physiology. For the first minutes we young students worried that he exhibited an excessive degree of pomposity. He was attired not in the customary and shabby white and stained lab coat of some more casual lecturers, but in the gold-embossed dress uniform of an Admiral in the Canadian Navy. He lectured on carbohydrate metabolism and insulin. We listened with rapt attention, and forgave Charles Best's vanity as he outlined his personal experiences in 1922 with the discovery and pioneering use of insulin. Later, I caught glimpses of his senior colleague Sir Frederick Banting at the medical library. Both of these Nobel Laureates were working on assignments from the Ministry of Defense. Best was seeking to better understand the cause and hopefully cure for sea-sickness. The crews of the Canadian Corvettes bobbed across the unforgiving Atlantic attempting with mixed success to intercept the Nazi U-boats whose goal was to sink freighters heading to the UK with supplies for an embattled nation and for armies gathering to set Europe free. Nausea and vomiting immobilized many brave seamen. Best made interesting observations but astronauts and sailors still await the "cure" for motion sickness. Banting lost his life on a Defense Department mission when his Canadian air force plane crashed in Newfoundland. Best lived to be a senior contributor to the discovery of heparin, an essential tool for cardiologists and stroke neurologists to this day.

Skepticism, as I would later learn, is a usual and a desirable sequel to any new idea in science. Some that followed the discovery of insulin in retrospect were over-zealous. First in this display of skepticism, the Chairman of Medicine in the Toronto General Hospital (TGH), where human injections of insulin were first given, decreed that neither Banting (surgeon) nor Best

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(physiologist) were qualified to care for patients. The responsibility for diabetics was assigned to two card-carrying staff internists Drs. Walter Campbell and A. Fletcher. Campbell was still in charge when I was a resident; he was insistent upon the use of the theoretical benefit (on unproven grounds) of a high-fat diet for all diabetics. ("A pound of butter per day" or its equivalent). Personal experience, opinion and authoritarian dogma had not yet been replaced by evidence-based decision-making. The second striking indication about insulin's efficacy appeared in 1923 when the British Medical Journal (BMJ) accepted an article describing six patients admitted to TGH in diabetic coma and mirabile dictu all were discharged to return to useful life. Until that time the survival from diabetic coma was a rarity-not ever dreamed of for six comatose diabetics in a row! An accompanying anonymous BMJ editorial cautioned the readers about the interpretation of this report. Unrecognized factors may have been at work including questionable diagnoses and exaggeration of the level of consciousness or possibly another less threatening reason for the depression of awareness. Today over a mere few months no large hospital would encounter six examples of diabetic coma and if chance directed that any occurred their recovery could be taken for granted.

As medical students in 1942 we were put into the Royal Canadian Army Medical Corps with the ranks of privates to ensure our availability before and after the close of hostilities. Instead of a year we had an abbreviated eight months of junior internship. Three episodes stand out most prominently from this exciting period: First as part of our rotation through various departments at TGH we went to Ward F, the public gynecological service. Here we encountered a great burden of human tragedy. Part of the ward harbored women with cancer, many with less hope than exists today. Many of the other beds were filled with women of all child-bearing ages and levels of society afflicted with imperfect, clumsy and at times fatal attempts by themselves, friends or shadowy practitioners self-taught to prey on women in distress to have an abortion. The duties of the junior intern involved watching for the need for transfusion or antibiotics. The revered and hated Dr. Morgenthaler wrote finis to this disgraceful intrusion on women's rights to make decisions without priestly or family interference. It was my second early encounter with individual rights to personal decisions being blocked by societal predjudice, equally as bad as our biased and racially-perverted admission to training in Toronto teaching hospitals. The second outstanding encounter had a happy ending. One night, on call for general surgery, a young nurse, Kathleen Gourlay and I were called at 3 am to attend to an elderly man who was 18 hours post-operative from a large ventral hernia repair. A violent fit of coughing and his bowel came through the re-ruptured incision. The nurse and I replaced it and I did the suturing. As we finished at 4 am and both were tired she offered to make us egg sandwiches in the ward kitchen. In the course of time she accepted my invitation to change her name and for the ensuing 60 years, made sandwiches for me and our four children. She never lost the sparkle or the graciousness that I detected that night in the Ward C kitchen. The final excitement was the smuggling from occupied Holland of one of the earliest models of an artificial kidney machine. We knew it was miraculous but little did we realize that after the war later and more efficient models would become standard equipment in all modern general hospitals.

By our Parliament's edict we were in a safe and privileged position where from we were obliged to watch the drama and the slaughter from afar. I recall exactly where I stood in the nursing station on Ward C of TGH when a nurse rushed in and fairly shouted: "Paris has fallen to the Allies". The sacrifice of Canadian life at Dieppe as a trial run of re-entry to Europe but more especially the spectacular Montgomery rout of the invincible Rommel in the African desert were sure omens that the tyrants loose in Europe were on borrowed time. VE Day followed quickly while I was still posted as Medical Officer to the Basic Training Centre in Newmarket, Ontario. With my classmates most of us had volunteered for training and service in the medical corps of a Pacific Division. In the spring of 1945 I was given a promotion to major. This promotion was revoked and the Division made redundant by the Hiroshima bomb and by the sequel a week later at Nagasaki, the necessity for which many of us still question.

During our years as Privates all of the class met once a week for an hour in a field behind Connaught Laboratories and were marched about " in column of route" taught how to "present arms", march ceremoniously in unison and to perform a few other useless maneuvers. Some of us enjoyed it, but most of us judged it rather brainless activity. None of it appeared to have any connection with the front-lines or the bed-side. Our rusty rifles were from World War I and we never saw any ammunition. We stood at attention while the polish on our brass buttons and army–issue boots was inspected. We looked and dressed quite unlike modern Canadian soldiers in the futile exercise going on today in Afghanistan, or that being pursued by the high-tech American forces in Iraq.

In Toronto racism flourished from the '20s' to the '40s'. Some senior medical attitudes and traditions were simply disgraceful. None of the 10% of my classmates who were Jewish were accepted as interns into the Toronto teaching hospitals. This was not because of marks; more than a proportionate number of the medalists and honor students were Jewish. Today this unforgivable discrimination would be unthinkable and vigorously protested, but to our everlasting shame at that time, there was no student protest by us the "meek" and obedient students of 4T4. Had we decided to strike or in some other overt manner object to the unacceptable tradition such as all of us applying to less prestigious hospitals elsewhere, leaving the teaching hospitals already deprived by the war of most of their senior residents. They would have been obliged to capitulate or try the impossible and run with a slim cadre of residents. As a class we did nothing! It never occurred to us that we had this power.

To distinguish us from real combat soldiers, in common with trainees in the Chaplains Corp we wore purple on our forage caps and on our epaulets. When we finished a mere eight months of Junior internships, we all spent a month in Camp Brockville and a month at Camp Borden to ready us for the rigors of overseas life at the front (where almost none of us were needed or sent). While at Borden the swaggering CO referred to us and the chaplains collectively and obviously disdainfully as "The Army of the Lord". Like the combat soldiers we spent our days doing route marches, on obstacle courses, and finding our way across field and forest using compasses and primitive maps. It was healthy but remote from medical attention to wounded or sick. We were instructed in the hygienic art of floor-sweeping, the

digging of latrines for multiple use, inspection of the genitalia of male soldiers lined up in a row with their pants down (a procedure known as "short-arm drill") looking for purulent discharge or hard sores and were advised of the existence of army-issue condoms.

In early 1946, I was assigned to meet and provide any needed medical assistance to the ill and wounded in a large group of Canadian troops undergoing repatriation on one of Cunard Line's "Queens" through New York Harbor. There was a small police patrol at the entrance to the ramp leading to the dockside of Pier 90. My Medical Corps captain's uniform soon established my identity and mission and I descended alone the ramp to observe the intricate maneuvering of tiny tug-boats putting the marine leviathan into its exact position. Steps were sent down and since nobody restricted me I stood beside the bottom of the steps. When the first passenger came down the steps I felt compelled to salute, Winston Churchill smiled and nodded (another "meeting with greatness"). Maybe he staggered a little as he headed with two men in business suits to a waiting car. In a few days he would deliver his "Iron Curtain" address in Missouri. Those were distinctly different days and no representative of the Department of Homeland Security was on hand.

Chemical attack on bacteria in the form of sulfanilamide became available in the later years of my medical course. Aware from medical lectures of reports of its toxicity I worried when I watched a surgeon dump a handful of it into the pus exposed in my father's peritoneal cavity. A ruptured appendix had led belatedly to the operating room. No matter, it saved his life.

In my last year of medicine, with my clinic group of six, we stood quietly (uncommonly so for such a lively group) at the bedside of an attractive woman in her 30's who had three young children at home. Our quietness was a reflection of the fact that she was doomed to die within weeks as everybody did when they had a subacute bacterial endocarditis. (A death commonly accompanied by major embolic stroke or infective cerebral aneurysm, both pretty dreadful). Our teacher rushed into the room smiling broadly and we all thought inappropriately. "Barnett, you are closest to the door and I want to observe how you give Mrs. Farquhar (how could I ever forget her name?) an intramuscular injection" and with that he handed me the needle and syringe with its content of a greenish-yellow murky fluid. When done he said: "Good you neither hit bone nor the sciatic nerve". He spoke on and grinning broadly: "but more than that you have just injected penicillin into the first Canadian civilian to receive it." The antibiotic era was born in Canada that day. The Connaught Laboratories, an industry owned by the University of Toronto had already perfected tetanus anti-serum and produced insulin. It was under contract to the Canadian army to make penicillin extracted from the growing mold. This product was probably full of allergenic impurities prior to its formulation being identified. Our teacher, Professor R. Farquharson had persuaded his colleagues to release a six-week supply. In due course Mrs Farquhar cheated death and went home to raise her family.

My next encounter with medical greatness was the opportunity in 1951 to take tea in his laboratory at St. Mary's Hospital with Sir Alexander Fleming and his neurological friend and my teacher at Queen's Square, Dr. Purdon Martin. I found Fleming to be modest, gentle and warm, obviously a reflective person. Florey who shared the Nobel Prize with Fleming, I met later during a stint in Oxford. As a temporary neurosurgical resident locum on the service at the Radcliffe Infirmary of Sir Hugh Cairns (an Australian expatriate, Nuffield Professor of Neurosurgery, former chief of the British Armed Forces Head Injury Unit and the inventor of the crash-helmet), I had occasion to seek a couple of consultations with Florey, another dynamic Australian who was on the immunology service. In contrast to Fleming he was more aggressive, impatient, fast moving and thinking. Together he and Fleming were a perfect team: one needed to reflect and check the accuracy of his data, and the other wanted to see "today" what use laboratory observations were for sick patients.

Oxford in 1951 had lured me for two reasons. First, a Radcliffe staff neurologist had expressed enthusiasm for a potential therapy (intra-thecal tuberculin) for tuberculosis (TB) meningitis, up to then an invariably and rapidly fatal disorder. Soon I became convinced that her concept was tainted with hope and optimism; maybe it added a few days and possibly a couple of weeks to dying patients. Other strategies (streptomycin and soon triple therapy) were already in sight. All the tragedy of omnipresent tuberculosis and the dread gloom of TB meningitis with its common involvement of the small arterial branches of the basilar artery were soon due to change dramatically. My study time at Oxford also recognized that poliomyelitis was still extant and serious involvement of the spinal cord neurons supplying the respiratory muscles required the horror of the "Iron Lung". This dreadful and noisy machine filling a single hospital room unquestionably bought time for some victims until surviving neurons recovered. A team of engineers, anesthetists and respiratory physiologists at the Radcliffe were among those perfecting what became the modern endotracheal positive pressure support that is used today whenever a patient loses spontaneity of breathing. Another huge leap forward was before my eyes because for poliomyelitis its usefulness in managing polio would be short-lived. Things behind the scenes were moving quickly and to continue my analogy were in the rehearsal stage for one of the greatest shows to be produced on earth in medical discovery. Raymond Parker, a Connaught Laboratory virologist and one of our teachers had succeeded in growing the polio virus, a necessary prelude to the development of a vaccine.

This remarkably effective vaccine was only a few short months away when my first year on the neurological staff of the Toronto General Hospital found me in charge of the polio patients. It was the worst outbreak for years, with an unusual incidence of the dangerous bulbar involvement. At its height I cared for no fewer than 12 victims at a time with varying degrees of muscle pain and weakness. We had no curative or even arresting treatment. (I admit that I entered this unit with some fear of becoming a patient. I recall wondering if I would have had the guts of the Aussies ordered over the top at Gallipoli). The only time I cried with relatives was when a 16-year-old boy, a bulbar victim, died and I was confronted first thing that morning by his parents. Through their tears they told me that their three younger children died of polio the week before across the street at the Hospital for Sick Children. Presently all three of us not only cried, we sobbed. The head nurse was passing and gently shut the door. As I left the Ward an hour later she rushed up and offered me her hand whilst looking into my red eyes. I remember

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recalling to her that at home I had two small children and hoped I carried nothing home. Within the year of this epidemic Salk and Sabin put an end to such fear and heart-rending experiences. They shared the Nobel Prize but the Committee overlooked the virologist who made it all possible. Polio is going to leave the earth completely and might have done so already save for the ravings of religious zealots.

My final chapter of intimate involvement with TB came in the spring of 1951. A patient on the private neurosurgical service failed to recover consciousness after a tumor removal by K.G. McKenzie, one of Harvey Cushing's last residents and Canada's first practicing neurosurgeon. The tumor was a tuberculoma and its removal had led to TB Meningitis. Up until then all patients so diagnosed had died. Intrathecal streptomycin led to his recovery and return to work. His young wife early queried the nurse in charge that such a young doctor as I appeared to be was performing lumbar punctures on and was seemingly in charge of the serious illness of the most important person in her life. Later and for years thereafter she forgave me and came with her husband annually from Toronto to London Ontario, to bring me a New Year's bottle of champagne. From my front-row seat I soon witnessed something else to marvel about: TB Sanitoria were preparing to close and their properties turned over to real-estate agents.

Yet another death-knell to a particular nervous system disability was about to be ameliorated because of antibiotics. In the late 1930's the Manchester neurosurgical giant Sir Jeffrey Jefferson reported on the unexpected and remarkable two-year survival of two men who had suffered traumatic paraplegia. During World War I nearly all such victims died in a few weeks. World War II was different and the ability to cope with bed-sore sepsis and frequently fatal urinary infections led to the survival of hundreds who were then trained to live useful wheel-chair lives. Their training was supervised in Britain at Stoke-Mandeville by the enthusiastic and energetic pioneer in this new arena Dr. Ludwig Gutmann. Charles Drake and I made frequent visits in 1950 and 1951 to pick up a few pearls from this dynamic physician. The physician-in-chief at Toronto's paraplegic Hospital, Lyndhurst Lodge, Albin T. Jousse selected by Harry Botterell was no routine administrative bureaucrat. He knew personally all there was to know about the neurological deficits of the 100 or so Canadian Forces members who were then the exclusive occupants of the Lodge beds. For all of them he watched carefully for improvement or complications, and knew their domestic circumstances and needs. With the Canadian Paraplegic Association he triggered a large part of the impetus to create wheel-chair access to public sidewalks and buildings.

It was my great privilege to share with Jousse any new neurological complication adding to the disabilities in both paraplegics and quadriplegics. In those pre-MR days with physical examination and oil myelography we detected a previously unrecognized form of syringomyelia: the post-traumatic variety. Our working hypothesis was that a cystic cord dilatation worked up or down the cord from the level of initial severe injury. This was confirmed when one Mrs. Brown whose accident occurred on a visit to Canada from Britain added upper limb weakness and sensory loss to her long-standing paraplegia. She died without use of her arms or legs in High Barnet Hospital, north of London. By virtue of Jousse' relentless pursuit of his problem patients and through a Canadian neurological colleague, studying abroad, Dr. Jock Murray, we were able to get permission for a post-mortem, including the spinal cord. Through Murray's efforts the complete length of the spinal cord was examined at Queen Square and the results verified that our conjectures were correct (Figure 2). Within a few months Dr. Tom Morley performed the first syringo-peritoneal shunt in the case of a paraplegic Winnipeg school teacher who was losing upper limb strength denying her the use of her wheel chair or blackboard. She returned to her tasks and was the first of many for whom this procedure was satisfactory. When last surveyed it was estimated that about 2% of traumatic paraplegics will suffer from this syringal extension.[1] A new variety and new classification of syringomyelia was not met without skepticism. I presented my first eight cases in paraplegics to the Canadian Neurological Congress. A senior colleague asked the chairman of this session "Is Barnett unaware of the existence of chance coincidence in medicine?" Within two decades the overwhelming contribution of good imaging to the study of the spinal cord, including eventually MR, dispelled any unduly skeptical doubts about the diagnosis of the five varieties of syringomyelia[2]. The notion that "all syringomyelia is hydromyelia" has passed into history. There may still be those who follow the dictates of the writings of their early Cleveland and Boston colleagues and still want to put a muscle plug in the obex of the 4th ventricle. Belief at times yields slower than it should to new facts.

A final encounter with post-traumatic syringomyelia will suffice to close this account. A Canadian friend, heading a major UK division of a Canadian company, fell 25 feet from a ladder

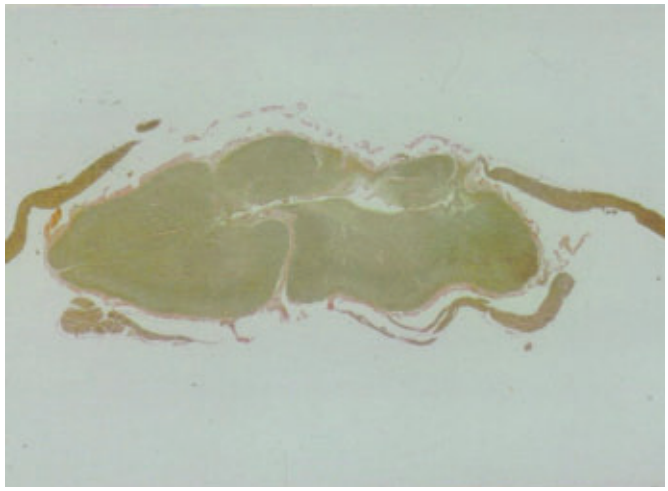

Figure 1: *Near the cephalad end, at C6. of a syrinx that extended from a cavity originating at the caudal end of a post-traumatic cystic lesion in the central cord that had extended up from the ten-year old fracture-dislocation level at L2/L3 converting a paraplegia into a disabling quadriplegia. This cross-section was taken at post-mortem from the first patient proven to be affected with post-traumatic syringomyelia. (courtesy of Dr. Jock Murray, Halifax).*

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and experienced a total motor and sensory permanent high lumbar paraplegia. Despite this his spirits rose to allow him to combine the use of a good brain with a determined nature. He became consultant to British Rail to advise on making all trains and stations in the UK wheel-chair accessible. One day he showed me the evidence. He drove me in his hands-control car from his home in Sussex to Folkstone in Kent, the location of the early main terminus of the under-Channel connection to France. All accesses and exits of the Stations at each end of the Chunnell and the new high-speed trains were modified to allow access by individuals working their own chairs. He retired after three decades on his project but not before all public transit in the UK had proper facilities for boarding wheel-chairs. For his dedicated activity, Britain's Queen conferred a special decoration upon him at Buckingham Palace. He lived to enjoy a friendly personal relationship with her family.

Ten years after my friend's trauma I received a trans-Atlantic phone call from a senior Queen Square neurologist, Ralph Ross-Russell, well-known for being one of the first to publish on platelet thrombogenesis as a cause of TIA and stroke. He opened the conversation by saying that he had learned from my secretary that I would be in London the next day and suggested dinner with himself and Mr. Lindsay Symon head of neurosurgery at Queen Square (he with a great interest in cerebral ischemia and who was among the first to use the term "penumbra" to denote the viable tissue persisting peripheral to an infarction). Ralph said "I saw a friend of yours as a patient today and I will bring his MRI to dinner tomorrow if you will join us. We think he has "your disease". No one had previously described post-traumatic syringomyelia as "Barnett's Disease or Syndrome." I am glad it did not persist as we have a confusing surfeit in neurology of eponyms. The patient had recently begun to experience painful numbness and weakness with wasting in his hands, both essential to his wheel-chair existence. The afternoon's spinal MRI was passed around the table in The Royal College of Surgeons dining room and for the first time I could observe the *in-vivo* distinctive appearance of a cavity in the middle of the cervical cord with a co-extensive cystic lesion extending down to the level of his L2 fracture. The following morning Lindsay performed Britain's first syringo-peritoneal shunt in the high thoracic region of the cord, the site of a post-traumatic syrinx. The procedure succeeded in ridding him of the hand weakness. Fifteen years of active wheel chair life were now ahead. I admit with some shameful immodesty that I was a little proud of the fact that the only medical entity of which I gave the first description was so meaningful to the life of a dear friend. As I subsequently told him, without Sir Alexander Fleming and Al Jousse he would not have survived for this experience.

From the years 1946 to 1952 I started my formal training to lead into clinical neurology. It began with a year as a Fellow in general pathology under the distinguished Dr. Wm Boyd. The other six Fellows appointed to these posts were men whose training careers had been interrupted by the War, all older than me, more knowledgeable and very focused, anxious to make up for lost academic years after returning from the battles of North Africa, Sicily, Italy, Holland and Germany. For me this was a piece of luck as they were all great teachers in the making. I learned much from them, as well as from Boyd's weekly autopsy presentations and weekly brain cutting with Drs. Eric Linell and Mary Tom. The next six years were divided at about two years apiece: resident in internal medicine at TGH, two years a neurological resident dividing the time between TGH and Sunnybrook and almost two between Queen Square and Oxford. I then joined the teaching staff of the Toronto General Hospital as a U of T lecturer and spent the first year as chief neurological resident and research fellow at TGH. I wrote papers on tumors of the brainstem, on the etiology of cerebral vein thrombosis, the etiology of cranial nerve palsies with cerebral aneurysms, ruptured and unruptured, and a case-report about probably the first patient anywhere to experience the dramatic and unexpectedly quick recovery of the distressing symptoms of Giant-cell Arteritis by the newly discovered ACTH loaned to me by Dr. Metro Ogryzlo who had an early supply sent to him by its discoverers at the Mayo Clinic. I failed to publish two "good papers", one on the motor paralysis of diabetics and one on Tabes Dorsalis. This lapse I have rationalized by my ability to continue to make use of the extra knowledge gained, standing me in good stead as a teacher and practitioner. This past winter I had charge of a daughter's cat that developed diabetes and a near paralysis of the hind legs. With the daily insulin that I gave it the beast could again, within a month, leap up unto the kitchen counter.

There were only three other TGH staff neurologists: Hyland, Richardson and Walters. All had been trained at Queen Square and had considerable interest in psychiatry. Eventually they established a separate psychiatric unit at the Wellesley Hospital, at the time a TGH- controlled institution. Shock therapy that had been a twice-weekly event on Ward G at TGH was removed entirely to the new unit. Thereafter I was spared the distressing experience of holding patients down during their induced convulsions and seeking out the occasional crushed thoracic vertebral body. Psychotropic drugs, with their own unique complications in due course made most shock therapy and surgical lobotomies redundant.

Because I had no training nor interest in handling Bipolar Disease, Schizophrenia or anxiety states, I declined an appointment at the new Wellesley unit. I heard of a rumored threat of my dismissal for this non-collegial behavior. An appeal to my departmental Chairman, Professor Farquharson accepted my wish to practice only neurology, something that nobody had yet ventured to do in Toronto.

The idea was expressed that if I stubbornly stuck to my plan I would "starve to death" and starve my family! Fairly soon the reason for experiencing anything close to hunger rations would be because I quickly found myself skipping lunch and getting home late for family dinner. I had a tough time organizing myself to the deluge of patient referrals. If the patient sounded at all sick I trained myself to squeeze all such referrals into an extended day. My car became the last out of the parking lot of our office building and frequently I locked up the outpatient clinic. I soon realized the meaning of the word "workaholic".

The years 1953-1959 found me fully engaged with teaching at the bed-side, looking after ward and private in-patients, consulting in hospitals (TGH, Sunnybrook, Weston Sanitorium, the Toronto Psychiatric Hospital, occasionally at Lyndhurst Lodge) and spending usually four afternoons per week in my private office doing referred consultations. I contributed sparsely to the medical literature but saw a huge number of patients and in the end became what I think I may claim to have become a

skilled neurological practitioner. All this stood me in good stead when the time came for me to become a clinical research person. The sine qua non for conducting disciplined research on clinical problems is to be an expert clinician. How else can the appropriate patients be selected for a trial or outcome events be credibly evaluated?

They were exciting days because a number of distinct entities were evolving. For example the role of the carotid artery in cerebral ischemia and stroke was beginning to be recognized, and I was the only person at first doing carotid angiograms at TGH or Sunnybrook; the role of the heart and heart surgery causing stroke had not yet been well explored; the role of cervical spondylosis in its nerve root and spinal cord manifestations was waiting to be delineated, as were lumbar disc changes as one of so many causes of backache but also seriously expressed by temporarily disabling sciatica or worse still intermittent claudication of the cauda equine. Under scrutiny were the diagnostic features and shunt therapy required to treat the newly-appreciated entity of Normal Pressure Hydrocephalus. It was hard to believe but a triad of symptoms in the elderly (dementia and confusion, urinary incontinence and apraxia of gait) could all go away when a drain was placed in the ventricle to reroute cerebrospinal fluid under normal pressure. The replacement of the mistaken diagnosis of the thoracic outlet syndrome by carpal tunnel/median nerve compression was going on and the entity and its specific features were as yet little known by family doctors and many others. I had learned about the carpal tunnel lesions from its original describer and my British bird-watching friend, Lord Brain. Too many patients with numb hands and upper limb pain were exposed to misinterpreted diagnoses and had their carpal tunnels opened; in time the pendulum swung back toward reality. The condition is real but strict criteria need apply in making the diagnosis and deciding on therapy.

Meanwhile toward the end of my Toronto days we had gathered data to allow us to deny without equivocation that all syringomyelia was hydromyelia. Before my career in practice was over, I had been referred about 400 syringomyelia patients from all five continents. With colleagues I was able to write the only English-language monograph[2] on the five varieties of this uncommon disorder, more than half of them being partially or more substantially helped by some variety of a shunt drainage procedure.

Tertiary syphilis was a favorite of mine. First of all the Toronto Department of Health paid me as much ($75) for my weekly evening attendance at the "Special Clinic" (a user-friendly way of saying Syphilis Clinic) as was the salary paid per month to medical residents at TGH by the hospital administration. Secondly, the three neurological manifestations of tertiary syphilis were hard to match for teaching physical examination to students and young neurological trainees. The progressive cognitive dysfunction in GPI, the remarkable and elegant sensory signs in tabes dorsalis and the small basilar artery and aortic branch lesions from the vasculitis of meningovascular syphilis. Penicillin made all these increasingly more rare and from time to time I would confide to family and friends that; "As a teacher of the importance of physical examination in neurological dysfunction I can say that I truly missed syphilis". If they looked discomfited by this I would hastily add that "I also truly miss sub-acute combined degeneration of the spinal cord "of which the elegant signs were sensory and motor. Vitamin B12 was discovered and the diagnosis of Pernicious Anemia, with or without neurological involvement (and sometimes only the latter in the cerebrum or the spinal cord) was instantly recognizable. Great "teaching cases" passed into the history books and it was my privilege to observe these major changes in medical practice.

I was happy in Toronto, the first 12 years at the Toronto General Hospital, the last year at Sunnybrook, there with the goal of converting the traditional service of neuropsychiatry of the old Christie Street Hospital into a Clinical Neuroscience Department. I felt a strong bond should exist between all disciplines working with patients afflicted with organic neurological problems. Most of the strong and exciting neurological centres in America were autonomous and emerging as the successors to the traditional European leaders: Queen Square and the Salpetriere. Neurology and neurosurgery in Canada remained under the budgets and thus the real control of Internal Medicine and Surgery. My ten-page suggested re-organization plan was rejected at the U of T and gathered dust. But not for more than a few months. I had sent a copy to my close friend Charlie Drake. He loved it and persuaded the Chairs of Surgery (Angus McLachlin) and Medicine (Ramsay Gunton) as well as University of Western Ontario's (UWO) President. (Carlton Williams) that this should be the future organization for the study, teaching and care of patients with disorders of brain, spinal cord and neuromuscular disorders. Thus I left Toronto in 1959 and left Sunnybrook in the capable hands of John Edmeads.

At the first meeting of the new UWO Department, seven of us sat around a small table. At the last meeting the number was closer to 46, made up of neurologists (26), neurosurgeons (9), neuropathologists (4) and neuroradiologists (7). Every member was expected at weekly half-day grand rounds, at a monthly dinner business meeting where all members were given the chance to bring up any topic of mutual interest, to suggest and review prospective new recruits to faculty or residency. Departmental Chairmanship was to alternate every five years between medical and surgical neurology.

My feelings since leaving my alma mater in Toronto for London's UWO medical school have always been mixed. Toronto was an exciting city with a plentiful supply of patients with every variety of neurological disease. The academic consensus remained that it was too early for any change in the organization of neurology and its traditional position as less than 10% of a parent department. Neurology's ship had no neurologist as a captain on its bridge. In London I was confronted with a brand-new hospital, with a burning desire in every Department to strive for excellence not just in patient care and teaching but also in the third and equally important area of medical research (both clinical and laboratory). The Directors of the London Health Association were the owners of and the recipients of the money from the sale of the now-empty TB Sanatorium in nearby Byron. The committed lay-person volunteers who had directed the TB San project were determined to use this money for research development. Substantial research space was built adjacent to each particular outpatient facility on each floor of the new facility. To this were added two vital components: 1) The appointment of a uniquely charismatic and energetic CEO, Mr.

Patrick Blewett; He never lost track of the three-level commitment of University Hospital. His door was always open to any senior or junior member of the staff. 2) Major commitment to all of the Faculty's extravagant goals and dreams by the London-wide community leaders of business and philanthropy.

The combined Department thrived and continues to be attractive even after Drake died (1999) and after I reached age 80 when I retreated to my forest home. The success of any attempt to repeat such an innovation as a combined Department requires a genuine spirit of collegiality with compromises, mutual trust, loyalty to the others and a deliberate suppression of any tendency to personal greed or jealousy. The leaders must set the tone and be ready to put personal interest(s) second to those of the group.

As expected "Eagles must fly": Three of our best MS workers left, one to a Chair in Oxford, one to eventually become Chair at the Mayo Clinic and the third of four MS researchers became chair at University of British Columbia (UBC) and later succumbed to premature lymphatic cancer. Of our neuro-muscular group two of our best were lured away, one to Boston (Tufts) and one to Calgary where recently he became Dean. The leader of our neuro-oncology group was Canada's first physician dedicated full-time to neuro-oncology. He was attracted to be Chairman of Neurology at the burgeoning medical school in Calgary. One of our leading experts in stroke left for Calgary having distinguished himself on the Canadian stroke scene, has now assumed the position of Dean of Medicine at Oxford University. Four departmental neurologists have assumed the senior editorship of important North American journals, two as Editors-in Chief of Stroke, {Barnett, Hachinski}, and two others for The Canadian Journal of Neurological Sciences, {Zochodne & Young}. Two neuroradiologists moved away. Fernando Vinuela went to a senior professorship at UCLA in Los Angeles. We had been fortunate to attract Gerard Debrun from Paris. The secretive Muscovite Serbinenko had stimulated him to get help from his engineers to design a system of cerebral artery catheterization with detachable balloons. Before he left us for the Massachusetts General Hospital he had imparted his technology to Vinuela and several other Departmental members, in the skills of catheter and balloon implantation a whole new development in cerebral vascular exploration and therapy.

It can truthfully be claimed that the enigmatic Debrun in London and the secretive Serbinenko in Moscow were the parents of the new specialty of interventional cerebral neuro-radiology. The irony is that London's earliest reason for world-wide attention depended upon Drake's novel ability to treat surgically the most difficult of cerebral aneurysms, especially posterior fossa aneurysms previously judged to be hopeless. Our appeal to Debrun to leave Paris and join our Department set in motion the work of Vinuela and his colleagues whose research and clinical work began and continues to gain momentum in proving that the non-invasive insertion of coils into aneurysms is an alternative to clipping for a substantial number of patients. This non-invasive treatment is being offered to a number of Drake's most challenging lesions. Some remain unsuitable and must be treated with open craniotomy. I was present at the death-bed of my friend Drake. The day before he left us a junior colleague arrived and updated him on the growth of this advance. Drake as ever listened with interest to a new idea, expressing guarded but gracious enthusiasm. Like many, but not all great men, he lacked or successfully suppressed professional jealousy and greed.

My passion for natural things and later for medicine lives on in my family. I married the nurse from the surgical ward, Kathleen Gourlay. She remained beautiful all her life, was gracious, thoughtful, caring of others and stayed with me just 12 days short of 60 years. Almost alone, she raised our four kids allowing me to remain a workaholic. One of them followed me into medicine (GI), one is heavily involved with a major environmental charity (Ducks Unlimited), as a biologist supervising its work in more than half of this country. Two daughters are successful writers of books for children, all non-fiction mostly about concerns with the environment and its effects on natural things. Two young grandchildren are well into medical school training and showing signs of equaling and excelling in marks and standing their two grandfather pre-decessors: Charles Drake and me. A combination of reasonable medical genes, their mothers' brains and dedicated hard work are operating in their favor.

The first 25 years of my journey were exhilarating but for me the best was yet to come. I was to be in and out of my front-seat quite often during the later scenes. The final curtain has not been lowered and presumably never will be.

To be continued in Part 2 - in an upcoming issue