Trinity Monday Memorial Discourse 2011

DENIS BURKITT

An Irish Scientist and Clinician Working in Africa

Delivered by Professor Davis Coakley

Provost, Colleagues, Ladies and Gentlemen.

I am very honoured to be asked to deliver the Trinity Monday Discourse on Denis Parsons Burkitt, a man whom I greatly admire. He is one of the most remarkable graduates of the medical school in its long history. Burkitt made great contributions to medical science, developed an international reputation during his life time and yet he was one of the most unassuming of men. Denis Burkitt occupies a unique place in the history of medical achievement. The first to describe a common and lethal form of childhood cancer in Africa, he was also the first to discover the cure for the condition. Following these achievements he embarked on a series of studies which helped to establish the link between many diseases of Western civilization and the lack of dietary fibre. Burkitt more than any other man, is responsible for the remarkable revolution which has taken place in the Western diet over the last thirty years.

Denis Parsons Burkitt was born in County Fermanagh, in February 1911. His father James Burkitt was the son of a Presbyterian Minister in Donegal, but James left his family's staunch Presbyterianism and became a member of the Church of Ireland on his marriage to Gwendolyn Hill from Cork, the daughter of a well known architect.

Both of his parents were deeply religious and this religious background would have a profound influence on Denis Burkitt's life. His father studied engineering at Queen's College Galway and graduated with a first class honours degree. He was appointed county surveyor to Fermanagh where he carried out an ambitious bridge building programme. James Burkitt was also a very able ornithologist and he has been described as one of the most original ornithologists of the first half of the twentieth century. During the early 1920's, he designed and conducted the first population study of a bird, the Robin, based on ringed individual birds. He discovered details of territorial behaviour, song, and threat display, and estimated the average life-span of this bird. After the completion of the robin study he continued to observe and to publish on the birds around his home. No doubt his children would have participated with their father in these activities. Certainly James Burkitt's geographical approach to his ornithology research bore remarkable similarities to the techniques that would be used years later by Denis, when studying tumour distribution in Africa.

When Denis Burkitt was a child he fell victim to the influenza pandemic known as Spanish Flu which swept across Europe towards the end of the First World War. Denis lay critically ill for days and it was thought that he would die. However, to the great joy of his parents he recovered and his mother attributed his survival to the hand of God. She would often tell Denis this story as he grew older and of her belief that God must have a special plan for him. Denis had an older sister Peggy and a younger brother Robin and the children grew up just outside the town of Enniskillen . Their parents lived a frugal life style, spending little and doing without luxuries.

Denis inherited this trait and it would later enable him to do first class research with small grants and minimal resources.

Education

Denis and his younger brother Robin were very close and they spent a lot of time together. Both boys attended preparatory school at Portora Royal School in Enniskillen. Portora was a very popular school for the sons of the Church of Ireland, landed gentry and the middle classes. The Irish writers Oscar Wilde and Samuel Beckett are other famous alumni of the school. When Burkitt was eleven years old his eye was injured in an accident at school. Efforts to save the eye failed and it was removed. Following discharge, Denis and his brother were sent first to another preparatory school in Holyhead in Wales and then to a secondary school in Cheltenham. Denis did not excel at academic subjects but he was good at practical things such as carpentry and photography, winning a prize for the latter.

The Burkitts moved to a larger house which was situated on 25 acres of land when Denis was 14. Denis and Robin loved their new home. They kept a rowing boat on a small river which flowed into Lough Erne and they went on expeditions to explore the many small islands on the lake. When Burkitt finished school he had no particular career ambition. At the time he described himself as "*timid and shy and lacking a sense of identity and direction.*" He eventually opted for engineering because his father had excelled in this area.

He enrolled in the School of Engineering here at Trinity College in 1929. From the start his tutor A. A. Luce had major reservations about his ability and motivation and he wrote to Burkitt's father warning him that his son might fail his end of year examinations which would result both in the loss of a year and of his fees. Years later Burkitt found this letter when he was going through his father's correspondence after his death and he noted:

> "*my father had underlined the words he had written on top of the letter "keep this" apparently feeling his son might have been underestimated. I have another letter written to me precisely half a century later in 1979 by the then Provost of the university. In it he informed me that I had been elected to receive 'the honorary fellowship of the College which we regard as the highest award which it is in our power to bestow'. Would that my dear parents could have read this second letter."*

However, engineering was not the subject at which Denis was to excel.

During his first year in college he was approached by a senior student who invited him to join a Christian Evangelical group which met frequently in house number 40 on New Square. The meetings became known simply as 'Number Forty'. In view of his family background it is not surprising that he found the meetings and those involved very congenial. These meetings played a pivotal role in his personal development and future career. He later recalled that "*it was through their influence*

that I made a halting commitment of my life to Jesus Christ. This gave me a sense of motivation, identity and direction." At this stage Denis was sharing a room in the College with a medical student and he found that he was becoming much more interested in his friend's medical books than in his own engineering texts. His prayers for guidance about his career led him to the conviction that he had a vocation to be a doctor and he changed his course to medicine. Burkitt's commitment to Christian Evangelism would remain with him throughout his life and he would accept all his failures, difficulties and triumphs as manifestations of the will of God. So, for instance, when he feared failing the entrance examination for the medical school because of his difficulties with chemistry, he prayed "*Dear God, if I am to be a doctor please get me through my chemistry."* God obviously approved of the plan as he passed comfortably. The idea that God sanctioned his decision to study medicine boosted his morale and academic performance. He ranked among the top students each year and he avoided undergraduate distractions and amusements. Instead he used his spare time to attend open air Evangelist rallies where he developed a persuasive speaking style that would be of great value in future years when presenting his ideas to international audiences.

Two years later his brother Robin also decided to study medicine at Trinity and they shared rooms in Botany Bay, in house No. 19. Burkitt obtained his clinical experience at the Adelaide Hospital. A classmate, the distinguished psychiatrist Norman Moore, who pursued his clinical studies with Burkitt at the Adelaide Hospital, remembered him as an industrious student who won the Hudson prize and Silver Medal at the end-of-term examinations before graduation. Burkitt came second

in his class at the final medical examinations in 1935 and as a result he hoped to get a houseman's post at the Adelaide Hospital. However, the position was given instead to a student who excelled at rugby and Burkitt had to cross the Irish Sea to England to do a house job in Chester. In the following year Denis was given a position in the Adelaide so he returned to Dublin for six months. After this he continued his training in England where he decided to become a surgeon.

His Early Career

Burkitt obtained fellowship of the Royal College of Surgeons of Edinburgh in 1938. He then spent five months as a surgeon on a cargo ship which plied between Britain and Manchuria. When he returned to England he worked as a surgical resident at the Prince of Wales Hospital in Plymouth. This was the most important posting of his life because it was there that he met a nurse named Olive Rogers who shared his religious convictions and who would later become his wife. Burkitt had decided that he wished to work with less privileged people and he volunteered for the Colonial Medical Service in West Africa early in 1941. He mentioned a sense of vocation in his application but this did not evoke the response he expected. He later recalled "*this surprisingly seemed to scare them and using the pretext that I had lost an eye in an accident as a child they rejected my offer without even an interview. This was a profound disappointment, but when I eventually reached Africa, God, in his mercy enabled me with my one eye to see things which my predecessors had missed with two."* The Second World War was then at its height so later in the year Burkitt decided to join the war effort by volunteering for the Royal Army Medical Corps. He married in July 1943 and a few months later he had to leave his wife to embark on a

troopship bound for Mombasa. At a railway station in the south of England, on his way to the boat, he came upon Norman Moore, his old classmate from Trinity College. Moore recalls:

> *"It was wartime and we were both in uniform. Denis was en route to embark that night on a transport ship for an unknown destination, leaving behind his newly married wife. To add to the disappointment of these personal affairs, the war seemed to be going badly then and it was the only time I have known Denis to appear sad and pessimistic."*

Burkitt served as an army surgeon for five years during the Second World Ward, 18 months of which he spent in East Africa. Burkitt managed to travel widely and he combined his surgical work with organising bible studies for soldiers. He was very impressed by his meetings with Christians in Uganda and he was captivated by the beauty of the country. He recognised that it was a country where he could make a significant contribution so after the war, in 1946, he reapplied to the Colonial Service to work in Uganda and this time his application was successful.

As a qualified surgeon and as one of only two in Uganda, he was disappointed that he was posted to a rural area in the district of Lango rather than to the central teaching hospital in Kampala. He worked in a 100 bed district hospital at Lira, 275 miles by dirt roads from the nearest X-Ray facility and with one African doctor to support him. He also had responsibility for the general medical care of the surrounding population

of 250,000 people scattered over 7,000 square miles. He worked in primitive conditions. He administered his own spinal anaesthesia and he trained a local man to administer ether when a general anaesthetic was needed. He sterilized his instruments on a paraffin stove and he did emergency surgery by the glow from an oil pressure lamp borrowed from his house. However the experience he gained here would give him great credibility with his colleagues working throughout Africa when he embarked later on his geographical study of lymphoma.

After eighteen months in Lira, Burkitt was appointed surgeon to Mulago Hospital in the capital Kampala, and lecturer at Makerere Medical School. Here he would work for the rest of his clinical career with a surgeon, Ian McAdam, who was a congenial colleague.

Discovering a New Disease

It was not until 1957 when he had been in Uganda for eleven years that he was introduced to a young patient whose unusual presentation of a jaw tumour, a condition common in that region of Africa, would change Burkitt's life and bring him international fame within a decade. He was asked by a physician, Hugh Trowell, to see a five year old child whose face was deformed by swelling on both sides of his upper and lower jaws. Burkitt had seen children with jaw tumours before but it was the first time he had seen swellings which were so symmetrical. Shortly afterwards when he was teaching at Jinja on Lake Victoria, some distance from Kampala, he saw another child with identical swellings. He brought the child back to Mulago and noticed that as the disease progressed, swellings also became apparent in other parts

of the child's body. He then began a meticulous search of the hospital records and he reviewed the cases of forty one children presenting with jaw tumours. Histology was available in twenty nine cases and revealed round malignant cells in the tumours. Careful search of the autopsy records in the hospital found that the tumours peaked between the ages of six and eight. The majority began in the upper jaw, grew rapidly and caused great pain. However, swellings were also found in other organs of the body in a significant number of patients. Most patients died within two or three months of the onset of symptoms. Burkitt presented his findings at a meeting of the East African Association of Surgeons held in Kampala in January 1958. He concluded his presentation with the following observation:

> *"I have limited my remarks almost entirely to the recording of observed facts and the presentation of a problem, with no offered solution. My contribution towards the relief of these children will appear little or nothing. The greater contribution will be made by those who interpret the significance of these facts, and who will, let us hope one day discover and perhaps eliminate the cause of this tumour growth."*

He could not know that he himself would play a central role in undertaking further ground breaking research on the tumour. Burkitt published his preliminary work in the British Journal of Surgery in 1958 confining his observations to 38 children with the disease where histology was also available. It is clear from the discussion that Burkitt was not certain of the exact nature of the disease. Two years later two

colleagues, Jack Davies and Greg O'Conor identified the tumour as being a lymphoma, that is a cancer of the lymphatic system. Burkitt was not the first doctor to describe jaw tumours in African children but he was the first to recognise that the jaw tumours were just one presentation of a single disease with a variety of clinical manifestations.

Stimulated by his early observations on the subject, Burkitt continued his work on the condition. He proceeded to carry out a survey which covered the whole of Africa and which has since been described as 'one of the most formidable investigations ever undertaken in the epidemiology of cancer'. Over 1200 leaflets were sent to nearly every government and mission hospital throughout Africa. The leaflets contained a photograph of a young patient and asked a series of questions. For 3 years, while still functioning as a busy surgeon at Mulago Hospital, he plotted the distribution of cases with drawing pins on a map of Africa which hung above his desk. All this research was covered by a grant of £25 which he received from the Ugandan government to cover the cost of printing and posting the questionnaires.

The work revealed that the tumour was common in an area spanning the Equator between 15º north and 15º south approximately, with a tail extending south along the eastern coast. Burkitt referred to this as the "*lymphoma belt*". The tumour was found in children from all tribes and ethnic backgrounds if they lived within the lymphoma belt. O'Conor and Burkitt then collaborated on a seminal paper which was published in 1961 in *Cancer*, a leading academic journal. Their research established that the lymphoma was not only the most common cancer among children in Uganda but that

it was probably as common as all other childhood cancers put together. It was also evident from the study that the lymphoma was not found in places higher than an altitude of about 5,000 feet above sea level.

The next challenge was to find the cause of the lymphoma. The research on distribution suggested a local agent and raised the possibility of a mosquito borne virus as a potential common factor.

Burkitt was invited to give a lecture on his work at the Middlesex Hospital, London, in March 1961. The lecture was entitled "*The Commonest Children's Cancer in Tropical Africa, a Hitherto Unrecognised Syndrome*". A virologist, named Anthony Epstein was present at the lecture. Epstein had studied medicine at Cambridge and the Middlesex Hospital and he was looking for a possible relationship between viruses and disease. He was highly regarded in his field and he had already published two papers in *Nature.* Epstein listened to Burkitt's lecture with growing interest and excitement. He was struck by the tumours unusual properties, particularly its rapid progression and restricted geographical distribution, which suggested to him that the tumours could be caused by an insect borne infectious agent probably a virus. Both men consulted after the lecture and Burkitt agreed to send Epstein frozen specimens of tumours from Kampala to examine for a virus. Epstein spent two years examining these specimens under an electron microscope without success. He was joined later in the search by an Irish Ph.D student, Yvonne Barr who had graduated in zoology from Trinity in 1953 and by Bert Achong, who was born in Trinidad and had studied medicine at UCD also graduating in 1953. It is interesting that Burkitt, Barr and

Achong all had strong links with Ireland and all three received their university education in Dublin.

Meanwhile Burkitt returned to Africa and decided to explore the southern boundary of the lymphoma belt to search for clues to the aetiology of the condition. As a surgeon he regarded this exercise as comparable with a pathologist's choice of marginal tissue for detailed histological examination of a lesion! He persuaded two friends, Ted Williams and Cliff Nelson, both experienced doctors working in Uganda, to travel with him on a journey of 10,000 miles across Africa which took him through eight countries. Most of the journey or 'tumour safari' was by road using an eight year old Ford station wagon. Occasionally they travelled on goods trains and on one occasion, when the roads were unusable as a result of torrential rain, they travelled by lake steamer. They acquired detailed information in sixty three hospitals along the way**.** It was an arduous journey but Burkitt maintained his sense of humour throughout. Cliff Nelson later recalled Burkitt remarking:

> *"This must be the safest ever safari in Africa. Here we are,*
> *three doctors, each with our private stock of medicines,*
> *making a beeline from one hospital to the next."*

Throughout his journey Burkitt found that his own previous experience as a doctor in a rural region of Uganda made him immediately acceptable to doctors working in similar conditions.

They succeeded in finding four fairly sharply defined ‘edges’ in this novel approach to cancer research. Initially altitude and temperature were thought to be the determining factors, but further examination suggested that rainfall was equally important. This supported the theory that an insect vector such as the mosquito might be involved in the spread of the lymphoma. All this research and travel was funded by a grant of £400 sterling from various sources including the British Medical Research Council.

Burkitt referred to the lymphoma in his early papers as African lymphoma, however it was known in Africa as Burkitt lymphoma. At a meeting of the International Union Against Cancer, held in Paris in 1963, experts from around the world agreed that Burkitt had described a new disease and that it should be known as Burkitt tumour. This was subsequently modified to Burkitt lymphoma. However for a number of years after this Burkitt continued to refer to it as the African lymphoma and according to his friend Cliff Nelson ‘*he tried hard to avoid having the tumour named after him*.’

The Discovery of the Epstein-Barr Virus

In 1963 Epstein and his co-workers, Bert Achong and Yvonne Barr finally made their historic discovery. A sample of tissue from Kampala had been delayed in transit. Tony Epstein noticed that the specimen was cloudy which is usually a sign of bacterial contamination. However, rather than throw it out he examined it carefully and to his surprise he found that the cloudiness was due to lymphoid cells which had become detached from the tumour during the flight . They successfully cultured these lymphoid cells and when they examined the cells under the electron microscope

they discovered particles in the cells which Epstein recognised as viruses. They published their findings in the Lancet in 1964 and the virus became known as the Epstein-Barr virus. Biological tests demonstrated that it was a new human herpes virus. The discovery of the virus led to the hypothesis that it was the cause of the lymphoma and that it was transmitted in the lymphoma belt by the mosquito.

However a chance event in the laboratory of Werner and Gertrude Henle in Philadelphia in 1967 established that EBV was the causative agent of infectious mononucleosis or glandular fever. This eliminated the theory that the EB virus was spread by the mosquito as glandular fever is found all over the world and is transmitted by saliva. This new information undermined the theories which were being developed by Burkitt and his colleagues. However Burkitt was not dismayed or disheartened. Later, looking back over a long career of successes and failures, he noted that he had learned from all his mistakes and added "*someday I'd like to write a paper on the fruitfulness of failure*."

Burkitt then postulated that children in the lymphoma belt were more vulnerable to the tumour inducing effects of Epstein Barr Virus because their immunity had been suppressed by malaria. Subsequently Burkitt lymphoma was found in Papua, New Guinea, where malaria was endemic. Sporadic cases of Burkitt lymphoma were also found in Europe and the United States with the same histology as the African lymphoma. Burkitt lymphoma has also been found in patients who have been treated with immuno-supressant therapy.

In recent years chromosomal abnormalities have been found in Burkitt lymphoma. The complex relationship between malaria infection, the EB virus and genetic abnormalities continues to generate research and debate in laboratories around the world. Burkitt once described his role in all this research as that of "*a launching pad from which others can fire their rockets*" adding modestly "*I was never a research man. It was a hobby.*"

The Search for a Treatment

Burkitt now took on the challenge of trying to find a treatment for this very malignant lymphoma. Initial attempts were not successful. As surgery was mutilating and the benefits transitory, it had been largely abandoned. One patient treated in India with radiotherapy had a short remission. However, radiotherapy was not available in Uganda at the time so Burkitt began to use anti-cancer drugs such as methotrexate and cyclophosphamide with the encouragement of Joseph Burchenal, Chief of Clinical Chemotherapy at Memorial Sloan-Kettering Cancer Centre in New York. Burkitt had to face many pragmatic problems in conducting his clinical trials. It was difficult to obtain blood tests so he used lower non-toxic doses of the drugs. Also some parents took the children from the hospital once any regression of the tumour had occurred. Yet despite these limitations Burkitt observed a dramatic response to therapy even in advanced cases but unfortunately in most of the latter any tumour regression achieved was temporary. He found that if the children were treated early the outlook was much better and some of these children appeared to achieve complete remission. Burkitt went to great lengths to follow the progress of his young patients, and found

eventually that the only certain way was to drive the child to his or her home and then to re-visit personally.

He presented twelve patients who had been cured of Burkitt lymphoma at an international conference in Kampala in January 1966. It was a remarkable advance as malignant tumours were not considered curable with chemotherapy at that time. Burchenal saw Burkitt lymphoma as an excellent "*stalking horse*" to stimulate research for a more permanent treatment of acute leukaemia, a disease which still carried a hopeless prognosis at that time. Time has shown that Burchenal was right and Burkitt Lymphoma has been used as a model to advance research and treatment on a wide range of conditions in haematology and oncology. Two decades later the renowned American oncologist, Ian Magrath described Burkitt lymphoma as "*an extraordinarily valuable paradigm that has afforded insights into topics that encompass the entire discipline of oncology*".

There is a plaque on the door of the Uganda Cancer Institute which reads in faded lettering 'The Lymphoma Treatment Centre is dedicated to Mr. Denis Burkitt for his perception and untiring efforts in promoting cancer research in East Africa. August 8 1967'**.** Sadly, fifty years after Burkitt's work in Uganda, the lymphoma is still a major cause of childhood mortality in the lymphoma belt of Africa. Although the doctors can achieve a remission rate of about 75% there is a significant relapse rate. Appropriate laboratory techniques are still not readily available and access to chemotherapy drugs is sporadic because of the cost involved which usually has to be borne by the patient's family. They just cannot afford it.

Burkitt resigned his post in Mulago Hospital in 1964 to make way for African surgeons after Uganda became independent . However, he stayed in Kampala on the external scientific staff of the Medical Research Council. This post allowed him to continue work with lymphoma patients and to continue his teaching at the Makerere Medical School. He began again to search for geographical factors which might influence other cancers. He hit the road again completing 11 safaris in 1964 and 1965. He conferred with medical staff at work in varying climates and conditions and he again circulated questionnaires on the incidence of various types of cancer. He was attempting to put together an atlas of cancers in Africa, noting their geographic distribution. He returned to London in 1966 where he continued to work with the Medical Research Council. He was introduced to Peter Cleave, a retired Naval Medical Officer, by Sir Richard Doll, the epidemiologist who first demonstrated the link between smoking and cancer. This meeting with Cleave was to open up a whole new area of research and endeavour for Burkitt which would become for him even more important than the discovery of the lymphoma. Denis was to describe this meeting as "*one of the most important in his professional life*." Cleave believed that many Western diseases were caused by over refined food and a lack of fibre in the diet. However his research work had not been taken seriously by the medical establishment and he was dismissed as a food crank. Burkitt was convinced by Cleave's data and conclusions as he knew from his surgical experience that many of the diseases such as appendicitis, diverticulitis and colon cancer seen in people consuming Western diets were not commonly found in Africa. He saw his discussions with Cleave as another pivotal and providential event in his life.

His old friend Cliff Nelson visited him in London in 1968 and asked about the latest on Burkitt Lymphoma. "*Okay Cliff*" he replied, "*it's all out of my hands now. All the really clever chaps in epidemiology, virology, immunology and biochemistry have left me in the dust.*" Then with a gleam in his eye he said, "*But I think I've found something else that may be more important – fibre in the diet; it's the forgotten factor."*

Burkitt decided to test the dietary theory. Travelling widely he acquired extensive data on the dietary habits of populations around the world. In 1969 he began to complement this epidemiological evidence with his own research on the effect of different diets on bowel behaviour. Burkitt examined the relationships between diet and the incidence of obesity, diverticular disease, haemorrhoids, hiatus hernia, varicose veins, ischaemic heart disease and diabetes. Based on the evidence that he accumulated Burkitt was convinced that there was a definite link between the prevalence of these diseases and Western diets.

Whilst undertaking these studies he still travelled regularly to Africa and on one of these visits, he met a biochemist named Alec Walker. Walker had studied the diets of black and white South African prisoners and had come to the conclusion that the Africans who consumed a diet high in fibre had a low incidence of diseases such as colon cancer, obesity, gall stones and diabetes compared to their white fellow prisoners who were on a refined diet. As a result Walker and Burkitt began to share research findings and publish together. Burkitt presented a paper on his nutritional

findings at a meeting in Kampala in 1970. His old colleague, Hugh Trowell, the physician who had referred the first child with lymphoma to him had also returned to Africa for the conference. Trowell had previously studied nutrition, being one of the first to recognise and describe kwashiorkor, and in 1960 he had published a book which listed diseases rarely seen in Africa but which were prevalent in economically developed countries. Burkitt and Trowell also began to work together and they subsequently published a number of papers and books on nutrition.

Burkitt already had a very high international profile because of his work on lymphoma. He now decided to use that profile to champion high fibre diets and to expose the risks of unhealthy Western diets such as those that were high in fat content sugar and salt, and low in fibre. He also condemned deep-fried food and once told an audience "*If you have an enemy, give him your frying pan.*" He published regularly on the subject and he travelled widely on lecture tours speaking both to professional and lay audiences. Burkitt told me about one such occasion when he was travelling to give a lecture in America. The lady sitting next to him on the plane seemed very worried and preoccupied and after a time mentioned that her husband was seriously ill. "*I am a doctor*" Burkitt told her, "*and if it will help in any way you can tell me about your husband's illness."* "*Oh*" she replied "*I doubt if you will be able to help as he has a very rare condition known as Burkitt Lymphoma*."

Fibre and Colorectal Cancer

Burkitt's paper '*Epidemiology of Cancer of the Colon and Rectum*' was published in 1971 and it became a citation classic making Burkitt one of the few researchers with

two citation classics in unrelated fields of study. In this paper Burkitt developed the theory that fibre depleted diets might be a significant factor in the genesis of large bowel tumours in Western countries. Burkitt's impact on nutrition began to assume more significance in public than his work on lymphoma and he began a crusade to change the diet of the western world from one of low fibre content to one of high fibre content, a crusade which proved remarkably successful. He wrote a book *Don't Forget Fibre in your Diet* in 1979 which had a huge impact on the general public selling over 200,000 copies and being translated into ten different languages. His research on fibre content and disease began a process that has generated considerable research internationally in a wide range of both clinical and scientific endeavour.

Preventative Medicine

When Burkitt retired from the Medical Research Council in 1976 he was appointed honorary senior research fellow at St. Thomas's Hospital Medical School and he held this position for twelve years. In these later years Burkitt used his energies to support preventative medicine in a broad context. He realised that the importance of this approach was underestimated as evidenced by the low priority it was given in the education of medical students. He summarized his argument with the words: "*Better to build a fence at the top of the cliff than park ambulances at the bottom.*" During the last years of his life he continued to travel, to lecture and to give interviews on this subject. Burkitt enjoyed lecturing particularly to students and young doctors in whom he tried to inspire both a caring and inquiring approach to medicine. "*Life is not a sprint*" he told them, "*but a marathon"* and if they were to achieve anything of significance they should be prepared to work hard for long periods. He frequently

quoted the old saying, '*He who is a slave to his map and to his compass has the freedom of the seas'* emphasizing that those who proceed cautiously taking opportunities as they present get much further than those who rush headlong at a project. He believed very strongly that good research could still be carried out on modest grants. "*You can put ideas into a machine and get dollars out*" he told his audiences "*but you cannot put dollars into a machine and get ideas out.*" He always stressed the importance of learning to communicate and develop relationships with other people and he maintained that too much emphasis was placed on the acquisition of book knowledge. At the end of his lectures he was often approached by members of his audience who asked him to autograph their books. He frequently wrote the following:

"Attitudes are more important than abilities

Motives are more important than methods,

Character is more important than cleverness

And the heart takes precedence over the head."

Return to his Alma Mater

Burkitt accepted an invitation to address the alumni of the Medical School of Trinity College during the quatercentenary celebrations of the university in 1992. He enjoyed the occasion as graduates returned to the university from all over the world and many were old friends. By a remarkable coincidence the guest rooms in which he and his wife Olive stayed during their visit, were in House No. 40, the very same rooms in which the evangelical group of students had met when he was a student and where he first began to contemplate a career in medicine. They visited Botany Bay where he

and his brother shared rooms as undergraduates and he also launched my book '*Irish Masters of Medicine'* . When Burkitt received the first copy of the book he responded with typical modesty "*I feel quite unworthy of being included*".

Denis Burkitt collapsed at his home in Gloucestershire in February 1993. Active to the very end he had given a lecture on that afternoon. He died on the 23rd March 1993 at the age of 82.

This year is the tercentenary of the medical school and it is also the centenary of Burkitt's birth, so it is very fitting that as part of the School of Medicine's celebrations the College will host an international symposium on Burkitt lymphoma. It will bring together the current scientific leaders in the field but it will also be attended by Denis's wife Olive and their daughters, by some of those who worked with Burkitt over the years including Sir Anthony Epstein and Yvonne Barr. All will gather to celebrate the life and achievements of Denis Parsons Burkitt, one of the greatest and most inspiring alumnus of our medical school.