



## Cell and Developmental Biology at UCL: A History

CDB has a long and illustrious pedigree which is captured in this series of pieces, written by long standing members of the department. These archive essays provide fascinating routes into CDB's story, including testimonials from those that shaped that history. For those interested in CDB's research portfolio, what follows places today's work in its proper context. For members of the department it's a fascinating primer on the pioneers whose work we proudly build on today.

Ed Whitfield, CDB, 2016

### 1. The early history of anatomy and anthropology in and around UCL

By Prof. Christopher Dean



Portrait of Charles Bell c.1839

The first professor of anatomy at UCL, Charles Bell was born in 1774 and came to London from Edinburgh in 1804. His mother was keen that he learned to draw and paint and she taught him to do so herself. His brother taught him anatomy and surgery at his medical school in Edinburgh. He established his reputation with his first book 'The anatomy of expression' in 1806, but his greatest work was undoubtedly the 'elucidation of the distinct structure and function of the nervous system'. In particular, (c.1820) he identified the dorsal and ventral roots of the spinal cord as having different functions (although at the same time Magendie also demonstrated experimentally that they were sensory and motor respectively - hence the 'Bell-Magendie Law').

Charles Bell was elected surgeon to the Middlesex Hospital in 1812 for a short period before being appointed to the UCL chair of anatomy. However, he was

critical and intolerant of the wrangling at UCL over a number of matters and resigned almost as soon as he had been appointed in 1830. Shortly after that Charles Bell founded the Medical School associated with the Middlesex Hospital in 1835, but within a year he had returned to be a surgeon again in Edinburgh. Charles Bell was certainly a renowned surgeon and is remembered now for his description of a lower motor neuron facial palsy (Bell's palsy) as well as for his description of the long thoracic nerve of Bell (the nerve to serratus anterior). In 1833 he also wrote a scholarly book on the comparative anatomy of the hand, a 'Treatise on the hand its mechanisms and vital endowments as evincing design' and he also took a great interest in the anatomy of the facial musculature and the expression of the emotions, as of course did Darwin later on. Some of Charles Bell's anatomical drawings and watercolours are still in the department of Cell and Developmental Biology at UCL. Charles Bell died in 1842 aged 67.

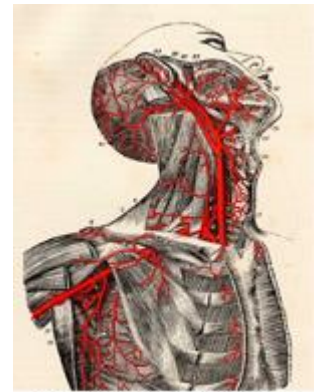
Around the early 1830's there was considerable disquiet about anatomy teaching in UCL, by both students and staff alike. The then professor, G.S. Pattison, had inherited the chair from Robert Cresswell (who seems to have spent most of his time in Paris - 'making a careful set of drawings' - and hardly ever appeared at UCL at all). At this time the bulk of the anatomy teaching was carried out by J.R. Bennett, the senior anatomy demonstrator. The students reported that Pattison, like Cresswell, hardly ever appeared and when he did, 'arrived in lectures wearing his pink coat and riding boots'. Moreover, he was reported by the students to have been incompetent in the dissecting room. Pattison, it seems, was regarded by all as argumentative and unpleasant and a man who appeared to be furiously jealous of his senior demonstrator. It took some time for UCL to 'move him on' – and out of anatomy and into surgery as it happens. Around this time (1834) the first University College Hospital was built (which cost £7,600).



William Sharpey FRS  
Professor of Anatomy from 1836 to 1874

Two brothers, Jones Quain and Richard Quain (professors of descriptive anatomy) were by then appointed to teach anatomy between 1831-1850. Richard Quain went on to become professor of clinical surgery at UCL (1850-1866) and died in 1887 leaving a fortune to UCL, which was used to set up a number of Quain chairs. Jones Quain first wrote Quain's Anatomy (UCL's first and most famous textbook of anatomy). In 1836 William Sharpey, who had trained in Edinburgh, was appointed joint professor of anatomy and physiology (at the same time that Richard Quain held the chair of practical or descriptive anatomy). Sharpey was the first person to introduce the microscope and histology practical classes into medical education and continually updated his research findings into new editions of Quain's Anatomy, which he was now co-editing with Richard Quain.

Especially important were his original observations on bone histology (Sharpey's fibres were described by him at this time in UCL). During his time he transferred the teaching of histology and neurology into the physiology department and left anatomy with nothing but the dissecting room to be 'the mere handmaid of surgery' it was said. Sharpey however, drew many talented physiologists to UCL, one such was, Sharpey-Schafer, who was so much in awe of his mentor that he prefixed his own name with his.



The carotid, subclavian, and axillary arteries (Treutmann).  
From Quain's Anatomy 1894



Sir George Thane,  
Professor of Anatomy from 1877 to 1919

George Dancer Thane (1850-1930) spent 63 years at UCL, as a student, a demonstrator in anatomy, as professor of anatomy and then as an emeritus professor. He held the chair of anatomy between 1877 and 1919 and was knighted in the year of his retirement for his services to medical education. Thane inherited from Sharpey, a department 'bereft of some of the chief interests of anatomy' but one also obscured and eclipsed by the brilliance of the physiology department.

Thane was one of the founders of the Anatomical Society of Great Britain and Ireland. He now shared the editorship of Jones Quain's Anatomy with Sharpey-Schafer up until the 10th edition, and each volume was constantly updated with new topographical and histological observations made at UCL. It was the first combined textbook of anatomy and histology and is still remarkable in both this respect and in its detailed and original observations. At the time of Thane's death in 1930, Elliot Smith still regarded the osteological illustrations as the 'best extant'.



The superior mesenteric artery and its branches (Thelmann).  
From Quain's Anatomy, 1884.

Quain's Anatomy had become world famous and was the data source of most subsequent major European anatomy textbooks for decades. Thane however, kept careful track of how the figures and text underwent a sort of 'anatomical Chinese whispers' as they propagated further from the original observations of its editors. A lot of details in certain later English textbooks were actually retranslated back into English from these German and French textbooks and became muddled in the process. Thane never actually wrote his long promised version of this history of topographical anatomy but he did finally agree to donate his card index of the details he had spent 50 years compiling to the UCL library.

Thane was the first professor of anatomy at UCL to teach anatomy to the Slade School of Art students, something he took very seriously. Felix Slade had left money to found the school and it opened in 1871. Henry Tonks a former surgeon and highly respected artist himself, who had been a demonstrator of anatomy at Bart's Hospital Medical School, was initially an assistant to the first Slade professor from 1893 but was then made Slade professor himself from 1918-1930 in almost exact parallel with Elliot Smith's professorship in anatomy. The bronze bust of Henry Tonks (the twin of Elliot Smith's bronze bust now in the dissecting room) is currently in the Housman Room.

In 1892 Arthur Keith had just returned from Thailand (Siam) and asked Thane if he could study for the FRCS diploma with the other students at UCL. Thane was happy for him to attend lectures but appeared totally perplexed about his research interests in comparative primate anatomy.



Students smoking in the dissecting room, 1927

Nonetheless Thane made facilities available to him. Keith started to attend human anatomy classes with Thane but found his lectures 'wearisome and boring' and stopped going. Thane subsequently caught Keith smoking a pipe in the dissecting room (apparently a near mortal sin at the time - although there are plenty of photographs of students and demonstrators smoking cigarettes in the dissecting room at this time) so Keith started going to his lectures again until he could bear it no longer.



The operative surgery lectures in 1893-4 were by all accounts only a little better than Thane's anatomy lectures. Keith said he never really felt a home at UCL, even years afterwards, but Thane was hugely supportive of Keith when he came to apply for the senior demonstratorship in anatomy at The London Hospital Medical School a year or two later. Thane was knighted for his services to medical education on his retirement.

It had been widely assumed that Grafton Elliot Smith would eventually become professor of anatomy in Cambridge but in 1919 George Thane retired from UCL after 42 years as professor of anatomy since 1877. Anatomy at the time across the UK was way behind other basic sciences and in particular, way behind anatomy in Germany and the USA. Physiology and biochemistry were the experimental sciences that were producing new results and Sharpey-Schafer, Sherrington, Haldane, Starling, Lovatt-Evans, Bayliss and others were the giants in this field in and around UCL. Anatomy at UCL had become dull and mundane under Thane in his later years.

In 1907 Professor E. H. Starling had proposed a plan to the college council for an Institute of Medical Sciences at UCL. The physiology building was complete by mid 1909 and the pharmacology extension by mid 1912. The plot of land between physiology and Gower Street remained empty and had been allocated for a new anatomy building but the 1914-18 war halted progress. At this time anatomy was partly housed in the North portion of the main college building and partly housed in 'low buildings at the back of the Birkbeck block'. Elliot Smith was in no sense an experimentalist himself at all, but he had a huge scientific reputation as a neuroanatomist and a reputation for shaking up old fashioned anatomy teaching methods and it is almost certain that Starling persuaded Elliot Smith to resign the Manchester chair and come to UCL to complete the plan to build a new anatomy department. He came with his old university friend J.P. Hill who was appointed professor of experimental embryology at the same time and later became professor of zoology at UCL.



From left to right: Grafton Elliot Smith, J.P. Hill and E.H. Starling. Hunting for antelope in New South Wales, Australia, September 1902

At this time, after the war, America was seeking to make closer ties with the UK and invest in medical education in Europe. Two representatives of the Rockefeller Foundation (Wickliffe Rose and Richard M. Pearce) were in Europe exploring the needs of medical education. They were particularly taken with an

innovation at UCL whereby clinical units had been set up to teach medicine. Before this time, physicians and surgeons earned their money in private practice and taught medical students when they were free and when they felt like it. At UCL full time clinical appointments had been made in medicine, surgery and gynaecology that allowed these subjects to be treated as 'cognate scientific subjects' in their own right. This innovation obviously excited the visitors such that within a few months of Elliot Smith arriving in 1920 the Rockefeller Foundation had announced a gift of £370,000 for new buildings devoted to anatomy, histology and embryology and a further £35,000 for UCH Medical School, for the 'maintenance and endowment of medical, surgical and obstetric hospitals'. Elliot Smith had indicated to the Rockefeller Foundation that the anatomy department of the future would be entirely different from something that had been regarded until then as the 'hand-maiden of surgery'. Elliot Smith was renowned also as an Egyptologist and his obsession with Egypt is still apparent in the design of the anatomy building that has Egyptian motifs both outside on the Gower Street facade and within. The main staircase of the anatomy building is one example as are the huge 'Egyptian pillars' in the entrance hall outside the anatomy lecture theatre.

George Thane had been a neat, precise, exacting man obsessed with orderliness - his room by all accounts cleaner than a surgical trolley. Elliot Smith on the other hand, was by all accounts chaotic. There were apparently in his office books, loose notes, manuscripts, more than 500 lantern slides mixed up with histological slides, newspapers and empty boxes all over the floor and tables, all in seeming disorder. But his colleagues noticed that he had an extraordinary visual memory and an internal mental orderliness such that he never seemed to have to hunt for anything. Everybody in the department referred to him as 'the old man'. One of the first duties he spoke of at UCL was to plan a new series of lectures to the Slade School of Art. A radiography unit was set up within anatomy and the medical students did experiments on each other with 'bismuth meals' (and worse). They carried out experiments on the



From left to right: H.A. Harris, E. Elliot Smith and H.A. Sherrin. Examining a specimen, UCL, 1920.

circulatory, respiratory and other body systems as part of their preclinical anatomy training (all of course scoffed at by clinicians).

Starling and Elliot Smith planned a medical sciences library (The Thane Library) and a new professorship in The History of Medicine. A huge number of young surgeons passed through UCL to study for the FRCS examinations including W.H. Woollard who returned later on as its next professor of anatomy. Raymond Dart and Solly Zuckerman were among the many who worked with Elliot Smith at UCL. Elliot Smith schemed hard to send as many of them as possible on a year's sabbatical to America to learn about experimental techniques in anatomy. By 1938 more than 20 of them had professorial chairs of their own across the world. While he himself published a lot at UCL it was largely a period of consolidation for Elliot Smith and not one of active research. He was thought of as a kind of 'scientific uncle' who knew something about everything. In January 1933 towards the end of his career he was knighted. He slowly became ill with hypertension and diabetes and was aware he was having small strokes for some while. There is a famous story Solly Zuckerman told about them standing together at a bus stop in Camden Town on the way home after a meeting at the Anthropological Institute when Elliot Smith complained of a cold on the right side of his nose and a tingling in his fingers which he had had all day and said "I wonder which blood vessels in my brain are leaking .... I wonder how serious a stroke it is going to be". The next day he was admitted to UCH and never fully recovered from that stroke. He retired from UCL in 1934 but died of a further stroke on New Years day 1937. It was then one of his students, Herbert Woollard, who had written the influential book on experimental anatomy, 'Recent advances in anatomy', following his sabbatical year at Johns Hopkins who succeeded him to the anatomy chair at UCL.





W. E. LE GROS CLARK, F.R.S.  
Dr. Lee's Professor of Anatomy since 1934.

Earlier, Herbert Woollard had written an anatomical treatise on the anatomy of the tarsier using specimens given to him by Le Gros Clark that he had brought back from Borneo. Woollard was one of many young demonstrators sent to America for a sabbatical by Elliot Smith (Johns Hopkins in his case). Following that trip he wrote his hugely influential book on experimental anatomical research (*Recent advances in Anatomy*) that resulted from his experiences there. This book had a profound effect and initiated a kind of renaissance in UK anatomy and greatly widened the scope of what people imagined anatomy to be. Woollard then went to Sydney as professor of anatomy but came back to Bart's Hospital Medical School to work with Le Gros Clark and then finally moved to UCL as professor of anatomy to replace Elliot Smith on his retirement retired.

In 1939 however, Woollard, aged only 49, died of a heart attack during a lecture to medical students. Following this tragedy Le Gros Clark was asked by the provost of UCL to fill the chair of anatomy. He writes that he agonised about this for a long while, being loath to leave Oxford, but accepted. UCL had a large staff and the best facilities of any anatomy department at the time. He was about to move back to London when war broke out and the provost called off all new appointments until the end of the war. By then Oxford had changed and had received huge financial support from the Government for research into wound healing and nerve injuries and things looked entirely different so Le Gros Clark chose to stay in Oxford and not come to UCL.

To read more about Le Gros Clark's life and research, [click here](#).

During the war the anatomy department was evacuated out of London. On its return, John Z. Young (J.Z.) was appointed to the chair of anatomy. Coming from the zoology department in Oxford at that time, he was a true experimental neuroscientist. J.Z. Young was first and foremost a zoologist and had written 'The life of vertebrates' and 'The life of mammals'. He felt strongly

that medical and dental students needed a better biological background than anatomy alone provided. Out of this belief came a course and a textbook, 'An introduction to the study of man' (1971), that covered topics from methods of thought, to homeostasis, growth and development, human evolution, demography and the origins and spread of culture. All medical and dental students sat an exam relating to this course (which was always very generously assessed by a professor who felt strongly that students should be encouraged).

### Some key references:

- [G. Elliot Smith, \(1930\) Journal of Anatomy 64; 364-367. Obituary notice, Sir George Dancer Thane](#)
- [W. Le Gros Clark \(1968\) 'Chant of Pleasant exploration'. E&S Livingstone.](#)
- [Warren R. Dawson \(1938\) 'Sir Grafton Elliot Smith', Jonathan Cape, London.](#)
- [Sir Arthur Keith \(1950\) 'An Autobiography', Watts and Co. London.](#)
- Negley Harte and John North (1991) 'The World of UCL 1828-1990', University College London.

## 2. UCL Anatomy Department - 60 Years Ago

### By Prof Ruth Bellairs

When I arrived as a new PhD student in the Anatomy Department in September 1947 the war damage to the College was still very evident. The dome and the cloisters had been bombed and were screened off and inaccessible. The buildings along Gower Street bore, and still do, pock marks from bomb blast and there were damaged houses and bomb sites all along Tottenham Court Road. The College was in the process of replacing some of its lost accommodation by building Nissen huts wherever possible; there were at least three in the front quad and three at the rear of Anatomy in the South quad. Two of these were, respectively, the academic staff dining room (with waitress service) and common room whilst the third and largest had just opened as the students' refectory. The huts were intended as a temporary measure, perhaps for about ten years, though some of them lasted for at least thirty, their usages changing from time to time.

The Department of Anatomy and Embryology, as it was then, was ill-lit and over-run with rats and cockroaches. I understood that during the war, when most of the College had been evacuated out of London, the Anatomy building had been taken over by a government pest control unit and that they were to blame for these nuisances. In fact, I suspect that damage to the sewers and years of war-time neglect were just as likely to have been responsible. I had quite a fright one evening when I was working late and heard a shuffling sound in a dark corner and thought an intruder was lurking there, but was greatly relieved when a rat emerged and rushed past me along the corridor. The building was much smaller than it is now and there were fewer people working there. The top floor was not added until about 1952; the present Histology Lab., Claudio's unit, the infill between Anatomy and Engineering and the area until recently occupied by Alan Boyde were all added later. On its south side the building was attached to some Georgian terraced houses where the Biochemistry Department now stands. One of these was the Indian students' hostel, which later moved to Fitzroy Square, and its inhabitants provided a colourful antidote to all the drabness around. The girls, especially, seemed glamorous as they did not wear western clothes but thin saris, even in the depths of winter, though I thought how cold they must be.

Gower Street was a pleasant and quiet road with such traffic as there was going in both directions. Much of that was flat-bottomed carts laden with fruit and vegetables and drawn by ponies, trotting from the old Covent Garden market to the now vanished street market in Seton Place, which was just off Hampstead Road. There were few cars and no buses so we would often open the windows along Gower Street in the summer. I particularly liked two street musicians dressed in rather tattered tail coats and top hats who capered around a barrel organ on the side of which was painted "Good Old London". There were several small shops including a dairy, a newsagent's and an antique/junk shop near the Euston Square Underground station, and the Euston Road was narrower than it is today.

I shared a shabby flat with June Marchant, another PhD student, at 4, Colosseum Terrace, Albany Street and we used to walk home via Seton Market where we would often buy herrings or kippers for a penny (old money; equivalent to about 0.5 of 1p) apiece and carrots for tuppence a pound. Our rent was £2.00 each per week and we shared a noisome bathroom with about 6 or 7 other people. My grant from the DSIR (Department of Science and Industrial Research, later the SRC and then the SERC) was £250 per year and I managed quite comfortably even though we spent a great deal of time going

to the theatre and Covent Garden Opera House, in the cheapest seats, of course. We felt very cultured! We had a radio but there was no television available then. Our life was a frugal one as there was little in the shops to buy, clothes and food, even potatoes and bread, still being rationed and we neither smoked nor drank and couldn't even dream of owning a car or taking holidays abroad.

Within the Anatomy department the third floor (the top floor at that time) was given over mainly to histology. At the south end the Reader in Histology, Mr Keith Richardson occupied the suite of rooms facing Foster Court. He was a cherubic-looking bachelor in his fifties who published little but whose high technical standards were legendary. He was a strict disciplinarian in his teaching and no chattering or whispering by the students was ever permitted in his practical classes. The north end of the third floor, now part of Physiology, was taken up entirely by the Histology teaching laboratory. Soon after I became an assistant lecturer in 1949 I was demonstrating there to an embryology class when the door was flung open and a student rushed in shouting, "Come on. King's have got him". "Him" was a stuffed bear and was the mascot of the medical students and had apparently been pinched by students from King's. Mascots seemed to be important in those days. Most of the class stampeded toward the door and down three flights of stairs and presumably a posse then galloped off to King's to extract justice. Although some students returned looking rather sheepish, that particular class ended early that day.

The second floor was known as the Embryology floor. On the east side, at the south end, the area beneath Keith Richardson's suite was the Embryology teaching lab., seating about twenty students. Later it was removed to the ground floor and became known as the BSc lab. and later still it moved to the basement. The Embryology lecture theatre was on the Gower Street side of the second floor. It seated about 50 students, sufficient for 2nd MB classes in those days, with wooden seats arranged in rows stepped up from front to back, and with the usual arrangement of doors from the corridor at both front and back. It is because of this former lecture theatre that the north end of the corridor was built lower than the south end so that there is a short flight of steps between them. None of the other corridors in the Department are interrupted by stairs in this way. In the nineteen fifties the Embryology theatre was moved to the ground floor (to make way for the first electron microscope) and has recently been renamed the Sir Gavin de Beer Theatre.

On the west side at the south end, Michael Abercrombie, recently recruited from Birmingham, occupied one large room which he shared with his wife, Jane, and three PhD students, of which I was one, and a very junior technician. There was a very small room reserved for tissue culture and its preparation. Abercrombie's interest was mainly in cell migration, a natural development from his early work on gastrulation in the chick embryo. He subsequently achieved great acclaim with his discovery, with Joan Heaysman, of contact inhibition of locomotion. Subsequently, he became head of the now defunct Zoology Department at UCL, and later moved to the Strangeways Research Laboratory in Cambridge as its director.

The north end of the second floor was occupied by Professor GR de Beer, head of the sub-department of Embryology and the most senior member of staff apart from Professor JZ Young. He had served in the Grenadier Guards in both the first and second world wars and had only just returned to academic life. During the inter-war period he had exerted a great influence on the subject. His monumental tome, "The Development of the Vertebrate Skull" (1937, reprinted 1985) remains the standard work on the subject; his book "Embryos and Ancestors" (1940) demolished the case for Haeckel's theory of Recapitulation, which had held sway since the mid-nineteenth century; and although he himself was a morphogeneticist his influence extended to the new, experimental, approach. His books, "An Introduction to Experimental Embryology" (1926) and, with Julian Huxley, "The Elements of Experimental Embryology" (1934) had a unique influence at that time. Unusually for those days, he was an outstanding linguist and enjoyed chatting to the occasional French, Italian or German visitors, few of whom then spoke much English. He was a highly cultured man with a keen interest in the classics and appeared to us a kindly man, though curiously shy despite his international distinction; he tended to address everyone as if delivering a lecture and seemed to avoid a two-way conversation. I suspect that he felt that he had lost touch with the subject in his years away from it. He left UCL in 1950 to become Director of the Natural History Museum and was, in due course, knighted, becoming Sir Gavin.

In addition to de Beer's personal suite (office, lab., technician's lab., and private cloakroom), there were two storage rooms, one for slides and the other for bottled material, which housed mainly marsupial and monotreme embryos collected by Professor JP Hill, and Professor T. Thompson Flynn, respectively. JP Hill had been head of the Zoology Department from 1906 – 1921, and then became the first Professor of Embryology in the Anatomy Department, retiring in 1938. T. Thompson Flynn had been head of a zoology

department in Ireland, but was best known to us all as the father of the then famous film star, Errol Flynn. Together, as young men, they had collected and worked on their material in Australia and there is a fine photograph of them hunting, complete with bush hats and guns, in a biography edited by William Dawson of Professor Grafton Elliott-Smith, the distinguished neuro-anatomist and a former head of the UCL Anatomy Department.

Two other significant occupants of the second floor were the departmental artist, Miss Turlington, who so beautifully illustrated J.Z. Young's book on the "Life of Vertebrates", and the departmental photographer. Those were the days before it was possible to obtain purpose-built microscopes with their own camera attachments so we were all heavily dependent on their services.

The first floor housed the head of the department, Professor J.Z. Young, and the departmental office with its single secretary. (There was no departmental administrator then). The Thane Library, the precursor of the present Medical Sciences Library, was also on the first floor, occupying the entire south end. It was named after Sir George Dancer Thane, the distinguished head of the Anatomy Department from 1877 –1919. He was famed for the revised 8th. edition of Quain's Anatomy, (the two Quains themselves having, successively, occupied the Chair of Anatomy in the nineteenth century), and I find it sad that his name has been lost to us. There was a pleasant atmosphere in the Thane Library with a comfortable leather sofa and armchairs where we could sit and browse through the latest issues. It was a gathering place for members of all the Medical Sciences departments, especially at 4 o'clock when a trolley-load of tea and cakes arrived from the refectory

The Anthropology Department, which had been a sub-department of Anatomy before the second world war, was housed at the south end of the ground floor, including the area that is now the de Beer lecture theatre. The north end was occupied by the Museum, the remains of which are housed in the dissecting room. A beadle, in his plum coloured uniform, was permanently on duty, sitting in a box outside the Anatomy theatre.

Much of the basement was given up to students, with the dissecting room and students' common room, though the present tutorial rooms were, I think, mainly used for storage. The main workshop was in its present location but a large amount of space was occupied by X-ray equipment and its associated dark rooms. This was a relic of a pre-war "living anatomy" course in which healthy volunteers (students) were injected with radio-opaque materials and

filmed as they performed physical tasks. Even in the nineteen fifties the potential dangers of such a practice had not yet been recognised.

### **The Academic Staff**

Professor JZ Young, FRS and Professor GR De Beer, FRS were the only professors in the Department, apart from Emeritus Professor JP Hill who seldom put in an appearance. I think there were two Readers, one for histology (Keith Richardson) and one for anatomy. There were about six lecturers but also several assistant lecturers This latter was a position that has now disappeared and at UCL was initially given as a three year starting appointment, at the end of which time one was upgraded to full lecturer if deemed satisfactory. If one did not pass muster, one was still allowed one more year in which to look around for another position. What a very civilised way to be given the sack! In addition there was always a group of Anatomy demonstrators, young clinicians working toward their Fellowship exams and teaching in the dissecting room but, additionally, carrying out small research projects.

The accommodation for academics was spartan by today's standards. Most rooms were essentially small labs, each kitted out for histology, with a gas-heated wax embedding oven on its own red-tiled stand, and wide teak benches running along the wall. The ovens, which were of copper, were often polished by the technicians and shone brightly, whilst the teak benches were polished weekly by a cleaner employed specifically for that purpose and tended to acquire a high patina. Apart from Professors Young and de Beer and the Reader in Histology, no-one had a separate office. Most rooms had an internal telephone but, so far as I know, no-one apart from the Professors Young and de Beer had an external one. There was a telephone box on the second floor which was usable only from 9.00 am until 5.p.m., all calls passing through the College operator which could be a wearisome business.. At other times one was *incommunicado* with the outside world.

### **Technical Staff**

At that time few of the technicians had any qualifications, some having started in the department as young as 14, the pre-war school leaving age. Discussions were afoot, however, and soon it became compulsory for the young ones to undertake day release courses and acquire qualifications. This was probably the first stage into developing a proper career structure for what is now a

highly skilled and professional group of scientists. In those days, most technicians were employed directly by the College, relatively few being paid out of research grants. They all had to suffer the indignity of signing in and out each day in a book in the entrance hall. Even worse, I was told, each Friday afternoon they had to collect their wages from the finance department of the College where they stood in a jostling crowd and waited for their names to be called out, an intimidating experience for our young embryology technician.

Apart from those of the dissecting room, most of the skills required were for histology. An exception was photography, the exclusive preserve of the highly skilled photographer, Mr. Pittock, who was rather grand and never known by his first name. He took all his photographs on glass plates, using a long optical bench. He was, of course, professionally qualified.

### **The students and teaching**

There were a mere 50 medical students in each year at this time, so that when I became an assistant lecturer in 1949 I had no difficulty in getting to know them individually. Unlike most of the other medical schools, UCL already had both male and female medical students, (though the majority were still male) long before it became compulsory to accept a quota of females. Saturday mornings were part of the normal working week, not only for the academic and technical staff but also for the students who had lectures or practicals to attend.

When Michael Abercrombie took over the embryology teaching for the medical students he decided that we would abandon formal lectures and teach embryology in a tutorial type system. The 50 students were divided into four more or less equal groups and the subject was arranged into eight key topics (eg. development of the heart or the urino-genital system). Four lecturers were involved and each was allocated two topics. The aim was to present the material in as varied a way as possible, giving short talks illustrated with drawings, handouts, serial sections, whole mounts and, above all, models. Attempts to devise and make working models were the most ambitious of our schemes, the one illustrating rotation of the gut being my especial pride. The groups of students circulated between us, week by week. This was a highly successful method of teaching human development though, sadly, it had to be abandoned as the numbers of medical students rose and rose. A minor problem, which could have been overcome by altering the location, was that it took place in the old Histology lab. on the third floor, a much smaller room than the present one. With a lecturer in each corner it was necessary to shout



to overcome the shouting of the lecturers in the other corners but it was a wonderful training for me at the start of my career in learning to throw my voice.

The intercalated BSc in Anatomy was inaugurated by JZ Young about 1948, the first student being PK Thomas who later became a distinguished clinical neurologist. During the following years the course attracted more and more students including some from other London medical schools and this often led to collaborative intercollegiate courses. For example, the embryology one (not yet rebranded as Developmental Biology) was run as a joint effort by Peter Silver (Middlesex), John Harris (Royal Free), Tony Glenister (Charing Cross) and myself for UCL.

There were no special courses for PhD students; you simply got on with the work and learned as you went. Government grants for PhD students were normally for two years, although they could be extended for another year if necessary, so it was quite normal to submit after two years only. Of course, our theses were considerably slimmer than the current ones but the torture in writing them was probably no less.

## **Research**

In the immediate post-war years most of the research in the Department was directed by JZ Young and was therefore inevitably based on neuroanatomy, usually backed up by experiments. For his own research he moved to Naples each summer vacation, usually with a group of his Anatomy BSc students, where he operated on the brains of octopuses and recorded the subsequent effects on their behaviour. Back home in the Department the brains were sectioned and stained and he spent the rest of the year in co-ordinating the alterations in behaviour with the structural changes in the brain. J.Z. Young was very influential in introducing new approaches to the subject. For example, the first transmission electron microscope in this country suitable for biological research was installed at the American Embassy in the early nineteen fifties by R.W.G. Wycoff, the scientific attaché. Impressed by its potential, J.Z. acquired a similar one (an early Siemens) for the Department, the first of its kind in any British university.

Michael Abercrombie's small unit, on which I feel more qualified to comment, differed from the rest of the Department in that the research revolved around tissue culture and microsurgical techniques. In those days it was not possible

to buy pre-packaged sterile tissue culture equipment and much of our time was spent in washing and sterilising glassware. Ready prepared tissue culture reagents were also not available and we were dependent on blood plasma which we had to obtain by cannulating the carotid arteries of fowls. The process was full of difficulties. Unfortunately, the dose of anaesthetic necessary to knock out the bird was uncomfortably close to that which would kill it, and even if this hazard were surmounted the tips of the cannulae, which had been made by the glassblower, were often wider than the carotids and, in order to prevent clotting in those pre-siliconised days, were coated in liquid paraffin which made them slippery to hold. Our microscopes were pre-war monoculars, though we had one “modern” dissecting binocular between us.

At this time the Society for Experimental Biology (SEB) was the major focus for experimental work. I remember that soon after I arrived at UC I went to an SEB meeting at King’s College London where paper after paper was given describing the distribution of alkaline phosphatase in different tissues. I began to feel guilty that I was not working on alkaline phosphatase too, but then no-one seemed able to explain to me the significance of it. I had not then realised how fashions sweep through science just as they do in other spheres of activity and was somewhat puzzled, though rather relieved, when interest in alkaline phosphatase began to evaporate.

There were fewer specialised societies than today. The Embryologists’ club held its first meeting on February 19th. 1948 at King’s College London. There were thirteen inaugural members, coming from various colleges in London, and of these I alone survive. In 1963 the club expanded to a national body and changed its name to the Society for Developmental Biology, later adding the prefix “British” (BSDB) when the American society of the same name was formed. In 1953 Michael Abercrombie was instrumental in launching the Journal of Embryology and Experimental Biology (later contracted to JEEM and then renamed as Development) and two years later the journal inaugurated an international embryological conference in Brussels, the first since the war and an event of great significance as, at last, we were able to meet our European colleagues.

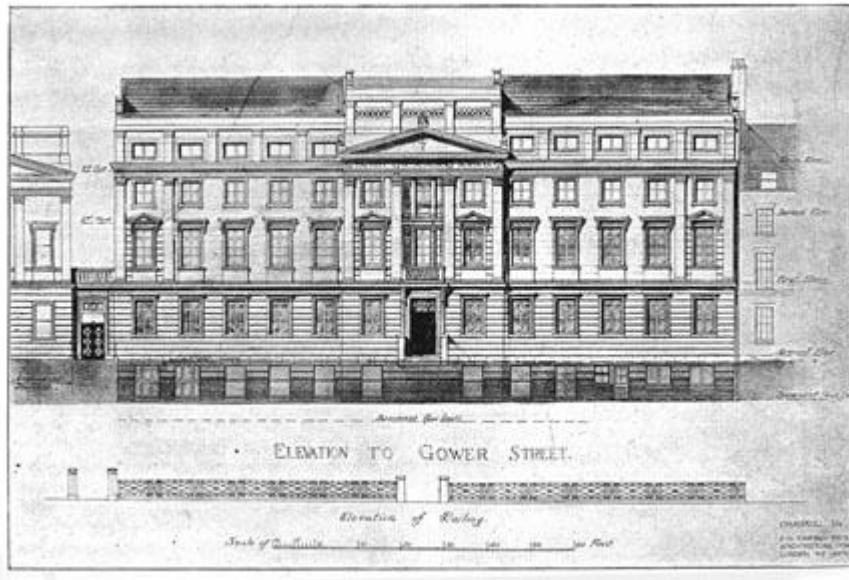
### **Then and Now**

There have been many changes since I joined the Department in 1947. After JZ Young retired Geoff. Burnstock became head of Department, and after his retirement, Nigel Holder was there for a brief spell until his premature death.

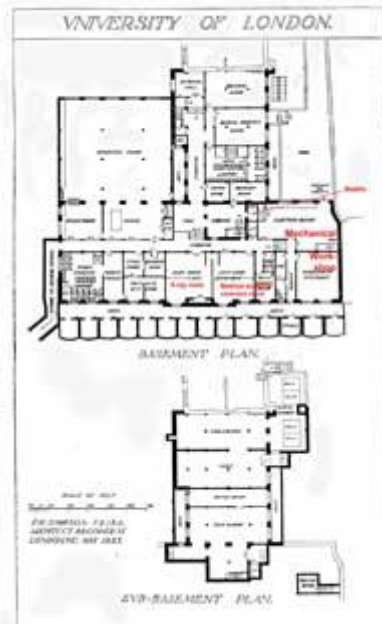
After a short interim period when Bob Lieberman was acting head, Claudio Stern took over as the present Head of Department. Each of these have made their mark on developing the Department into what it is today and much could be written about their contributions and of those of the many other people who have worked in it. But I have been concerned here mainly with describing the Department as I found it in the late nineteen forties and early fifties. Perhaps the thing that would have surprised me most if I had been able to look into the future would have been neither the increase in size of the Department, both of space and of the numbers of people, nor even the wealth of modern equipment and facilities, but the amazing decline in the importance of histology, that mainstream of anatomy and developmental biology in the 20th. Century. But what would have thrilled me most would have been the emergence of molecular biology and its overwhelming effect on every aspect our subject. I feel I have been lucky to have experienced it." *Ruth Bellairs*

### 3. Original Architects' Plans for Anatomy Building at UCL

These are the original architects' plans (dating back to May 1923) for the Anatomy Building at UCL. The red annotation shows the occupants of various rooms as they were in 1947, soon after J Z Young took over as Head of Department in 1945.



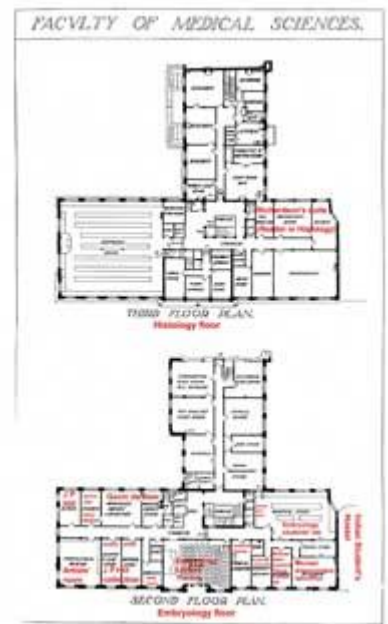
Elevation to Gower Street



Basement and Sub-Basement



Ground floor and 1st floor



#### 4. Now and Then

*This document was written on June 26, 1997 for the Retirement Symposium of Professor Geoff Burnstock, who was Head of the UCL Department of Anatomy and Developmental Biology.*

*It contains valuable information on the history of the Department and the history of Anatomy at UCL.*

Written by Prof A R Lieberman who was Dean, Faculty of Life Sciences.

Geoffrey Burnstock – Retirement Symposium June 26, 1997

#### NOW AND THEN

First of all, apologies for the enigmatic title. The organisers were pressurising me to come up with a title and I chose “Now and Then” before I had time to think it through. On reflection, a more explanatory and helpful title would have been “Then and Now”.

What I want to do in this talk is look briefly at ways in which the Department and its environment have changed, especially over the last two decades or so, but going back a bit further than that, in order to obtain a broader perspective covering the post-war period.

Anatomy goes back to the foundation of the College, and the Chairs of Anatomy and Comparative Anatomy were among the original 24 Chairs. These Anatomy Chairs have had some distinguished incumbents and some very odd ones.

Robert Grant was the first Professor of Comparative Anatomy and held the Chair for 46 years. According to Harte and North, in their history of UCL, Grant gave five lectures every week throughout the entire 46-year period, never once in all that time failing to deliver a lecture. By today’s standards, I suppose, that is unusual enough, but what is really odd by today’s conventions is that he delivered every lecture in full evening dress.

Then there was Granville Sharp Pattison, Grant’s contemporary and the first Professor of Anatomy, who was at the centre of one of the great scandals in the College’s history. He used to turn up to give his lectures in hunting pink! But the hunting pink wasn’t the problem. The problem was that, according to his students, he didn’t turn up in his eccentric apparel often enough, and when he did his lectures were hopeless. Students complained, they even

demonstrated; their demonstration in 1830 was the first recorded student protest at UCL, indeed it was probably the first in the history of the UK university system.

Charles Bell supported the students and the Provost of the day, Leonard Horner, at that time called the Warden, attempted to sack Pattison, who initially resisted, giving rise to internal warfare which led ultimately not to Pattison leaving but also to the resignation of five other founding Professors in 1830-1, either as a protest against Pattison or as a protest against his sacking. Finally, the Warden himself was forced to resign. I like this story, for which I am again indebted to Harte and North. I like it because of the idea that students in 1830 would demonstrate openly and vociferously to protest about poor teaching, something we haven't seen much of in universities in this country in modern times. Of course in those days the students paid the tuition fees and provided for their other needs themselves. Now that the wheel is again turning in that direction, it will be interesting to see if students who have to pay a significant part of the costs of their higher education themselves will be more inclined than at present to be tolerant of poor teaching. Personally, I think they will be less forgiving and this is likely to be at least as effective a stimulus for teaching excellence than any number of teaching quality assessments by panels of professional educationalists and academics from the New Universities. We shall see!

After Pattison, the Quain brothers (Jonas and Richard) and then George Dancer Thane held the Chair of Anatomy and then came Grafton Eliot-Smith. It was Eliot-Smith who set the Department on course as a centre for nervous system research and he also played a part in establishing UCL's reputation in the field of physical anthropology. He was followed in the Chair for a brief period by Woolard, but during most of the Second World War the Chair was vacant and the Department of Anatomy along with the rest of the Faculty of Medical Sciences was evacuated to Leatherhead and then Bangor, and the Anatomy building, which had been put up with a very generous donation from the Rockefeller Foundation and opened in 1923, was used as government offices. Thus the modern era of the Department really dates from 1945 when J.Z. Young was appointed to the Chair and the Department moved back into this large and empty building on Gower Street.

The academic staff at that time numbered eight, including J.Z. Young, Jack Aitken and Graham Weddell, later Professor of Anatomy at Oxford. By the

time of J.Z. Young's retirement and the start of Geoff's reign in 1974/5 the permanent academic staff had grown to 21 or 22 including five Professors. And now as Geoff Burnstock in turn prepares to step down from the Chair, the permanent academic staff has grown to twice that number, including some 20 Professors, five of them FRs. I will comment further on this extraordinary expansion in a moment.

It is also interesting and illuminating to look at the growth over the years in the College's income and expenditure. In 1944/5 the College's total income was £254,000 and there was a surplus on the year of £8,000. By 1975/6, Geoff's first full year here, the income had risen to £17m. Last year, 20 years on, and with the grants to the three Postgraduate Institutes now flowing through the College's books, its income from all sources was £250m with over £9m of that being the income of the Anatomy Department. About half of that £9m represented grants and contracts brought in by the Anatomy Department staff.

And here I'd like to comment on Geoff Burnstock's role and achievements in this extraordinary growth over the last 20 years. In the 60s and on into the early 70s, the universities had it relatively easy. They were in a growth mode. New Universities were being created and the existing ones were being expanded as a determined effort was made to increase the proportion of 18 year olds entering higher education. Thus it was relatively easy to grow. Medical student numbers, for example grew progressively from 60 in 1960, my year, to well over 100 in 1970 and of course with the increase in number came new income, new demands on teaching and the financial wherewithal to appoint new staff to do it.

During that period J.Z. brought in a large number of new staff. But while most medical schools in the UK were recruiting traditional Anatomy lecturers, i.e. people with a medical qualification, the essence of J.Z.'s recruiting policy was to bring in people with achievements in or potential for research. Thus the medics he recruited were mostly ex-UCL students who had been stimulated by the intercalated BSc degree that J.Z. had introduced, and were excited by research, and for the most part these people were wooed away from medicine before ever they had qualified.

That group included Ray Guillery, Ray Lund, Noel Dilly, Keith Webster, Semir Zeki, Chris Wylie and myself. But J.Z. recruited more widely than this and went much further in ignoring the traditional values of most UK Anatomy Departments to bring in both to research posts and to teaching posts

individuals with backgrounds and interests that were unorthodox for an Anatomy Department. They included Wilf Taylor, an engineer who spent his time trying to make artificial eyes, Betty Roots and Pat Johnston whose principal interest was in the biochemical composition of cell membranes, Elizabeth Deuchar and Martin Evans who worked on molecular changes in early development, Pat Wall and Gene Merrill both neurophysiologists, John Noble and John O'Keefe, both with backgrounds in behavioural science, Donald Sholl and Brian Cragg, with backgrounds in mathematics and physics who had turned to neuroscience, Brian Plomley, a botanist turned social anthropologist, Robin Weiss a zoologist who was opening up a new area of research on RNA viruses and Edwin Clarke and later Bill Bynum, historians of medicine. This wonderfully rich mixture of people with diverse disciplinary backgrounds gave the UCL Anatomy Department one of its most distinctive features, one that has been not merely preserved but further extended under Geoff's Headship, during which we have welcomed to the Department colleagues with disciplinary backgrounds in Zoology, Physiology, Pharmacology, Biochemistry, Molecular Biology, Genetics, Computer Science and Physics. There were, however, limits to the breadth of recruitment and I don't think he has recruited any theologians.

What has been special about the expansion of the Department over the last 22 years is not simply the high quality and varied disciplinary backgrounds of the staff recruited but that it has taken place against a background of multiple negative factors, including the financial pressures against which the universities have had to fight since 1974, the severe restrictions on, and fierce competition for space in a crowded and densely populated central London site and the decline of Anatomy as an academic discipline in the UK as a whole.

Among Geoff's special qualities is his ability not merely to resist the threats of financial cutbacks but to somehow turn each threat into an opportunity for expanding and strengthening the Department. Among other qualities that Geoff possesses in full measure is the ability to make his decisions emerge as though they are those of the Department as a whole. And another is to handle individuals, the carrot and the stick so skilfully that people can emerge from meetings with him, elated and happy even though what actually happened at the meeting was that they had their teaching load doubled or their lab space halved.



Another of Geoff's great qualities is that he has always been not just a Department man but a College man as well, advocating, disinterestedly, policies that are in the best interests of UCL as a whole. And if it happened, as more often than not was the case, that this particular policy or that particular way of deciding on resource allocation, favoured the Anatomy Department, well of course that couldn't possibly have been predicted. And, of course, he has done this and much more, while at the same time running a large and successful research programme.

There is probably not one of us here today who hasn't perceived these qualities personally from one perspective or another, most of us, most of the time, as beneficiaries, some, occasionally as victims. In appointing Geoff to the Chair the College was appointing a man for the times and the Department and College were very lucky indeed in that choice.

In 1973/4 when the uncertainty of what would happen after J.Z.'s retirement was gripping the Department and few of us had heard of Geoff, let alone thought of him as a prospective replacement for J.Z., and with ill-founded rumours rife that the College intended to make an internal appointment to save the cost of bringing in someone from outside, a majority of the academic staff sent a letter to the Provost proposing that a particular member of the senior staff should be appointed to the Chair. The person in question was much liked and of appropriate scientific distinction but the fact is he would have been completely hopeless as Head of Department. I do not now recall all of those who were signatories to this letter, which the Provost and Search Committee very sensibly consigned immediately to the dustbin, but I suspect that every one of the signatories came to feel very relieved that this is what was done with their letter and that all of them soon realised what wallies they had been. I know I did!

We have not nearly enough time to review all of the specific achievements of the last two decades and the major changes that have taken place under Geoff's leadership, but I'll try briefly to highlight a few. For me, without a doubt, Geoff's primary achievement has been to make Anatomy at UCL not only the biggest, but, in terms of research, the best in the UK, Europe and possibly the world. Like J.Z. before him, Geoff has nurtured the research culture of the Department and has created conditions in the Department under which individuals have been able to achieve their research potential. He has consistently recruited excellent staff and except in those cases where it

was necessary to recruit for a specific teaching or other purpose, he has done so purely on merit and has not sought to direct the research of the staff along particular lines which is something that I believe has been much appreciated. In terms of the provision of communal facilities from which everyone in the Department could benefit, the Molecular Biology Lab, the confocal microscopy unit, and state of the art transmission electron microscope facilities stand out as good examples. Another of Geoff's policies that has been important is that of rewarding people for achievement by putting them forward for promotion at the first realistic opportunity. I think it's fair to say that this policy has not only benefited staff in Anatomy but had a knock-on effect that has been felt in other Departments of the Faculty and even further afield.

The large number of Professors in the Anatomy Department is a source of great pride to us, as it must also be to Geoff, but it tends to provoke rather different emotions in other environments. Those of you who are card-carrying Anatomists – i.e. members of the Anatomical Society, may have seen the article by "Semitendinosus" in the Spring 1997 issue of the Society's newsletter. In this article, which is quite amusing but with an irritating edge, Semitendinosus tells the story of a group of Anatomical Society stalwarts at a meeting of the Society a few years ago, when the Tomlinson report and its aftermath were being much debated in the media. These anatomists were drinking in the bar and having a good laugh at an Evening Standard article urging the need for drastic reform in London Hospitals and Medical Schools. The article ridiculed the waste and inefficiency of service and education provision in London, using as its coup de grace the fact that there were 23 Professors of Anatomy in London and depicting this as a ludicrous overprovision. Of course, put like that it would seem ridiculous to an uninformed readership but what was really causing the Anatomy fraternity to chuckle maliciously over their beers was that UCL had been made to look silly because as the Evening Standard article pointed out, the vast majority of those Professors were at one institution,

UCL. Semitendinosus also suggested that the malicious chuckling of the stalwarts was tempered by wistful speculation as to whether they might have been elevated to personal chairs had they been at UCL. Those who find the large number of Professors at UCL amusing or who think we award Professorships too easily, should perhaps look at the RAE ratings for their own Departments and then reflect on the implications of the fact that in the 1996 RAE, UCL Anatomy achieved a 5\* rating on the basis of a submission that

included every member of the permanent academic staff – to be precise, the Anatomy submission included 52.4 full-time equivalent Category A Research Staff. The only other 5\* Department in the UK was Birmingham which submitted for assessment only six members of a staff two or three times higher than that.

This outstanding performance in the RAE is one of Geoff Burnstock's achievements. But it is also ours and whatever other presents you may receive as part of these celebrations Geoff, I suspect that the achievement of your colleagues in the RAE last year, the vital counterpoint to your own efforts, will be one of the gifts on which you place the greatest value.

A few words now, about achievements on the teaching side. I think that three matters are worth noting. First, the introduction into the Department's teaching portfolio of two new degree courses, Anatomy and Developmental Biology and Neuroscience which have both been successful innovations. Before these degree courses were established, the Department had taught undergraduate medical and dental students and had a very strong intercalated programme, but apart from this, BSc teaching was largely done as a service to degree courses based in other Departments. These were, therefore, the first three year degree programmes to be organised and taught by or largely by the Department. Another has been the large expansion in taught postgraduate courses (i.e. MSc) and in research student numbers, both very important areas in which to have encouraged and ensured development.

And finally in this context I think that Geoff's role in making the teaching of topographical Anatomy one of the highlights of the medical course deserves mention. Geoff, of course, did not in this case lead from the front; human gross anatomy is not his cup of tea. Indeed I am told that a couple of years ago Geoff was to have been part of the UCL staff team to meet a team of past UCL students in a game of University Challenge in the course of Alumnus day; apparently in the trial run Geoff was stumped by a tricky question in the area of topographical anatomy and in the end decided not to compete, probably because of the prospect that with a Professor of Anatomy on the team there would be lots of anatomical questions. I'm told that the sticky question that gave rise to this most uncharacteristic loss of self-confidence was "which part of the body contains the tibia"?

But so what if Geoff was not a human anatomist: the important point is that he adopted a very effective policy of ensuring that the teaching was done well. He

recruited first class people to do the job, made sure that they had the best designed and equipped dissecting room in the country to work in, and under John Peggington and subsequently Chris Dean, Pat Anderson, Peter Abrahams, Susan Evans, Fred Spoor and Paul O'Higgins, the Anatomy course has become a highlight of the medical course.

Incidentally, the fact that Geoff Burnstock was not a card-carrying Anatomist nor a medic caused hardly a stir when his appointment was announced, a far cry from what happened when his predecessor was appointed in 1945. The Anatomical establishment and the medical profession were outraged and a number of senior Professors and Clinicians wrote to the BMJ to deplore and criticise J.Z.'s appointment. J.Z.'s great success as a Professor of Anatomy, however, paved the way for others and particularly for Geoff at UCL, but there is no doubt that the sentiment that only a medical man or woman can lead an Anatomy Department remained prevalent for many years and is one of the ironies of recent decades that the very people who fought so hard to retain the purity of Anatomy as a discipline and as the domain of the medical mafia, are now revealed as the instruments of its demise.

For if we look around the UK and ask where is Anatomy holding its own alongside Biochemistry and other preclinical disciplines and Departments and where, over the last 10 years or so, have Anatomy Departments disappeared, to be merged with other preclinical Departments or to be scattered among various other clinical and preclinical Departments, what do we find? Anatomy has flourished where the Chair holders have been scientists of distinction and a research ethos has pervaded the Department. And where has it died or lives on only by the skin of its teeth? Where dinosaurs roamed of course! The dinosaurs in question being the members of the "only a medical man can teach anatomy and be a proper anatomist" brigade. One only has to look at what has become of Anatomy at, for example, Sheffield, Newcastle, Belfast, Aberdeen, Dundee, Leeds and Southampton and to know something about the individuals who steered them through the last few decades to appreciate this, although there are, of course, some honourable exceptions. One story I particularly like, that illustrates the profound differences in mentality between people like J.Z. and Geoff on the one hand and dinosaurs on the other, concerns the Anatomy Department in a major provincial University, where in the late 60s and 70s the Professor of Anatomy formally banned oscilloscopes from the Department on the grounds that such instruments were not part of an Anatomist's armamentarium.

In closing, I should like to add a personal comment from my perspective as Dean for the last seven years, during which time I have tried to balance my longstanding love of and loyalty to the Department against the requirements as Dean to display objectivity, fairness and sensitivity to the views of people in all Departments of the Faculty. From that perspective, I can only say that Geoff has been the most awkward, the most argumentative, the most difficult and the most demanding Head of the Departments in the Faculty and I would guess, the entire College. And quite right too! That's why he has been such a success and such a good Head of Department. Geoff, difficult though it has sometimes been, it has been overall a pleasure and unquestionably a privilege to work with you. I wish you a long, successful and happy non-retirement.

Prof A R Lieberman Dean, Faculty of Life Sciences