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**Dr John Nunn MD DSc PhD FRCS FRCA  
in interview with Lady Wendy Ball  
Oxford, 10 February 1998**

WB Dr Nunn, I would be grateful if you could tell us something about your early background, perhaps about where you were born and when?

JN Well, I was born on the 7th of November, 1925 in Colwyn Bay in North Wales.

WB Had your family been in that area for a long time?

JN Yes, my father was a solicitor in London and he moved to Llandudno in 1883 and then he moved across into Colwyn Bay which is only a few miles down the road and that's where I was born.

WB And you were a very late child I believe?

JN There had been two marriages. He married first in 1886 with four children and then his first wife died and he married my mother in 1922.

WB So, you have very much older siblings?

JN Well, I did have. I'm afraid now they have all gone. Yes, they were very much older than me.

WB And what did they do? Were they also in the medical line at all?

JN He only had one son and he was a solicitor. Then he had three daughters: two of them married and one didn't. They didn't actually follow careers themselves very much.

WB So, there was no medical influence in your family?

JN No, I'm not aware of any medical people at all in my ancestry.

WB Did you have a rather strange childhood being such a late child on your own with a very elderly father?

JN Well, my father died when I was only four. I hardly remember him at all, so I was in fact an only child of a single parent; it was just my mother and I, and a number of elderly aunts and so on. But I certainly lacked the benefit of having siblings of my own age with whom I could interact, yes. I always felt a lack.

WB You missed that?

JN Oh, indeed yes.

WB Did your mother go out to work?

JN No, she looked after me. She had been a nurse. During the First World War in particular she served in Salonika and had a very exciting war, but she regarded it as a full-time job, looking after me.

WB Did you go to school locally?

JN Yes, locally. We moved to Coventry and I went to the prep school there and then I went away to Wrekin, a boarding school in Shropshire, at the age of 13 just at the time that the Second World War broke out.

WB Did that affect your mother again? Was she working in any sort of war effort?

JN No. She was not too young either, she would have been about 54 by then, and we moved back to Wales because our house was in Coventry and we were under the belief that it had been damaged, which in fact it turned out afterwards it hadn't. We spent the war mostly in Wales.

WB And you were at Wrekin, so you were not too aware of the war going on?

JN No, there wasn't any activity in that respect at Wrekin. And in the holidays I was in Wales where the occasional bomb would be dropped by planes returning from a raid on Liverpool perhaps, if they had a few bombs they wanted to get rid of, but on the whole, no.

WB So, a peaceful childhood?

JN Yes. My only real contact was 'Dad's Army'. I was a founder member of 'Dad's Army'. I joined it when it was still the local defence volunteers, and I watch *Dad's Army* with absolute fascination because it's a very factual account of what happened.

WB Is it really?

JN Oh yes, its not much exaggeration. But, that was an experience.

WB It must have been. Did you see anything very frightening happen?

JN No, nothing at all, but it was tremendous comradeship and I think it did a lot to raise our spirits.

WB So, you were at school, boarding, with all boys at 13?

JN Very much, yes.

WB Was this a shock to the system after being in a largely female household?

JN Yes, I think it was really. I don't think boys' boarding schools are ever exactly a lot of fun. You know, people have said that when they go to prison subsequently they find it actually no worse than boarding school. I've heard that said by so many people.

WB But, you didn't feel it yourself?

JN Well, no, it wasn't too bad really. I frankly quite enjoyed it. Yes, and I should just mention that it was a school which had a great athletic reputation but it was not strong on the sciences and the result was that the number of boys taking A-Level science was very few. I remember well that the class who were proceeding towards medical school numbered six, so there were six of us who had virtually individual attention in physics, chemistry and biology for two years from dedicated teachers who were delighted to have people who were responsive to their teaching. So, I had the most marvellous background in the basic sciences which I've valued and esteemed ever since.

WB Had you always known you were going to be a scientist? Had you always been interested in that field of study rather than any other?

JN Yes, I think so. Science didn't start in those days until the age of 13 and at O-Level I rather enjoyed science. In mathematics I reached a point, I think it was the square root of minus one, when I realised that I just didn't have the intellectual calibre to handle mathematics. And then I decided to go for medicine. One had to take the decision in those days at the age of 15 which is very young, but it meant giving up maths which was actually a relief at that stage, although I've regretted it since, and concentrating on the three subjects of chemistry, physics, and biology which I enjoyed enormously.

WB But in fact you also had the chance to do a lot of technical work, didn't you, which has stood you in good stead?

JN I joined the workshops and I did a year of carpentry and three years of metalwork and I think we will come to various points in which this has been of tremendous value.

WB And you were obviously very good with your hands.

JN Well I certainly enjoyed it, put it that way.

WB But you must have employed a certain amount of maths in that side of things?

JN Well, it's interesting really how maths came to one's work later on, particularly when I became involved in respiratory physiology. There is a considerable mathematical basis to respiratory function and I really have felt the lack of maths quite a lot. I've had to go back and learn maths. But, in those days, one

could only do three subjects and that was a fact.

WB And you were playing a lot of sport at that time?

JN Yes but I'm no great athlete I have to say. I'm not very good at ball games, but it was a school in which great emphasis was placed on sport.

WB But, you're a mountaineer, aren't you?

JN Well, that was at university.

WB But you weren't earlier?

JN Not at school, no. It was when I went to university, that was the university of Birmingham; then I became involved in both fencing and mountaineering.

WB But going back to school, can you remember what influenced you to go in for medicine rather than any other scientific pursuit?

JN I cannot recall. I was torn between teaching and medicine. I had a difficult decision to make there. I feel very strongly about teaching and I feel I would have enjoyed teaching and in fact I've done a great deal of teaching in medicine. But, how I got involved in medicine I can't really recall. I think it was probably a love of the biological sciences.

WB So, you took your A-Levels in the normal course of events and despite the war, you went up to Birmingham?

JN Yes. We were reserved in those days and National Service was deferred. So, this was 1943, off to Birmingham.

WB How long was your degree course?

JN Five years. We were remitted the first year. It should have been a six-year course, but A-Levels counted in lieu of the first year, so I started as a second year student, that is in anatomy and physiology.

WB Still no idea of going in for anaesthesia at that time?

JN Oh no, no, not at all.

WB Just a straightforward medical ... really?

JN Well yes, gradually I decided that what I really wanted to do was be a general practitioner. That's what I thought would be my vocation.

WB So, what did you think of your undergraduate course?

JN Well, it was very good. I look back on Birmingham and think we were very,

very thoroughly taught. I would stress that this was during the war, we were reserved and we felt that we were in a very privileged position in that we were allowed to continue our studies when all our contemporaries were in the army. It wasn't a fun university period in the way one feels it is nowadays; there was no exciting social life. We had lectures all day and we were either lectured to or we were in the laboratory pretty well the whole time. It was thoroughly hard work, but they covered the field of medicine in great thoroughness, very little was omitted, and I feel I was well trained in the medicine of 1948, which is now of course history.

WB But who was left to teach you during those war years?

JN Interestingly enough, our Professor of Anatomy was none other than Sir Solly Zuckerman who was away on wartime service advising Churchill and they brought in a retired general practitioner who had always wanted to teach anatomy, Charlie Smout, and he gave the most superb lectures and brought anatomy to life. He was a wonderful man and I'll always remember him with great affection.

WB You really were quite lucky in your teaching?

JN Yes, all sorts of people appeared, and I'm sure they had great difficulty finding anybody to teach in those days.

WB You say you had no social life, but you actually did start mountaineering quite seriously, didn't you?

JN Yes, I did. This was of course in Wales, although I had one Alpine season in 1947, right at the end of the war, and got to the top of Mount Blanc. I was actually president of the university mountaineering club and then I took to fencing and finished up as captain of the university fencing team.

WB Never having fenced before?

JN No.

WB That's very commendable.

JN Well, I enjoyed it. It was great fun.

WB Yes. Do you still fence?

JN No. Alas, no. I don't think I'd be fast enough.

WB But, the mountaineering became combined with geology, didn't it?

JN Yes. Well, by an extraordinary coincidence, in the course of the mountaineering, I met up with some geologists and they'd obtained funding to take the first university expedition to Spitzbergen which I should explain is halfway between the Arctic Circle and the North Pole. It's only 700 miles from the Pole, and they were going to do their Honours B.Sc. theses there and they wanted a doctor just

in case something awful happened. They also wanted a mountaineer and I was recruited in that capacity.

WB This was just after you qualified?

JN It was the following day actually. It was degree day one day and the following morning at 6 o'clock we set off on a lorry to Newcastle and then across to Bergen and then up in a coal boat and so to Spitzbergen.

WB Had you had any experience of that type of terrain?

JN Well, only two weeks in the French Alps but that was a good deal more than the others had had.

WB Really?

JN Yes. Well, I found myself teaching them ice techniques as they were practised in those days, which of course is not the same as now. Then in addition to that, my third job was cartographer and I mapped one hundred square miles of Spitzbergen which had never been mapped before.

WB How had you come to know about cartography?

JN Well, I learnt on the job. I used a chain laid out on the coastal plain to get the base line and then triangulated using a plane table with a simple visual sight. And then off we would go to the places we had fixed and gradually triangulated the whole area.

WB And do you know how accurate you were in retrospect?

JN Well, yes, I've seen the maps that are now available and it wasn't too bad. We got most of it right. The real problem was we would triangulate on a point and then we had to get to that point for the next station and then we found we couldn't get there because it was inaccessible or something like that.

WB And you were hauling all your own equipment?

JN Unfortunately, yes. We took a sledge with us, but it was either tundra, rock or heavily crevassed glaciers, and the sledge was not an option. So everything was carried on our backs, that is to say tents, sleeping bags, food and we were away for seven days at a time from our base camp. Then, being a geological expedition, we would come back loaded with rocks. So, it was very hard physical work and the terrain was extremely broken.

WB You must have been very, very fit?

JN Well, I wouldn't care to do it now, shall we say.

WB What about menaces like polar bears and...

JN Well, polar bears happily at that time were almost extinct. They'd been heavily hunted and we never saw a polar bear. Now, polar bears are abundant and are widely recognised as being extremely dangerous, they can run, swim and climb faster than a man and you cannot escape a polar bear. The only thing you can do is shoot it with a high velocity rifle which we didn't have.

WB Did you have no weapons?

JN Yes. We had a .22 pistol and a shotgun but in retrospect we could not have stopped a polar bear. I don't know what would have happened, but happily it didn't arise.

WB You were very lucky.

JN Well, I think we were lucky.

WB Did this give you a taste for such expeditions? Did you continue?

JN No. I've never been on another expedition afterwards. At the time I noted in my journal 'I shall have happy memories afterwards but I want to put it down in writing now that this is a ghastly experience'. It was pretty heavy. But looking back, it certainly was fun in retrospect.

WB So, you went straight from your degree on this expedition and then you came back to Birmingham for a little bit?

JN Then I had to do my house jobs. House jobs were deferred because of the expedition. I should just mention that the expedition was funded by the Scott Polar Research Institute and it's in their records. Well, as I was saying, back to house jobs and I did one medical and one paediatric house job, but no surgical house job, which later turned out to be quite significant.

WB Did you enjoy those jobs at the time?

JN Oh yes, it was great fun, the first time that one was actually responsible for looking after patients. Then I met my wife there; that was the most important factor. We met in May 1949 and then married on the 24th September 1949.

WB That was a very rapid courtship for one who had no social life?

JN Well, that is because of the next stage in my life which was to go into the Malayan Medical Service and I knew that I was leaving for Malaya at the end of the year and it was very nice to take one's bride with one.

WB And that was allowed at the time?

JN Yes, it was.

WB Why had you chosen Malaya?

JN Well, I didn't exactly choose it. What happened is that Sir Melville Arnott, the Professor of Medicine in Birmingham, came in one day and said that he had come to an arrangement that if anybody was prepared to go to Malaya for three years in the medical service, they would be exempted military service which was two years. Now, Malaya had a very vicious war at that time with Communists in the jungle and this was an acceptable alternative. So the choice was between three years in Malaya or two years in the army and of course you could take your wife with you to Malaya.

WB Who was running the Malayan medical service at the time?

JN I think it was Dr Bynoe<sup>1</sup>, I think he was the boss.

WB But it was coming from the Malayan end?

JN No, no. This was actually the Colonial Office at Queen Anne's Gate. I was duly appointed in Queen Anne's Gate. Actually, I was in the Colonial Medical Service although the words grate a little bit now.

WB But you were still considered a soldier, doing national service or not?

JN Not really. It was the civil service.

WB So it really was an either/or?

JN Oh yes. We were definitely civilians.

WB What did you find when you got to Malaya?

JN We landed in Penang which is, as I'm sure you know, a most beautiful island off the coast of Malaya and that was at that time the headquarters of the medical service. So the idea was that I should start off in Penang and then when they'd sorted me out and discovered what I could and could not do, I would then be posted up-country to some small station where I would be the medical officer and expected to do everything. But, they discovered that I had never done a surgical house job and one of the basic rules was that everybody had to be able to take out an appendix or whatever might arise. So, I was pushed off on the first day up into the surgical department and the surgeon there said 'Well,' he said, 'I need somebody to give the anaesthetic now and there's nobody else, so you go and give the anaesthetic.' So, off I went on my first day and there was a child of two with a hernia to be anaesthetised with open chloroform on an open mask, you see, very basic techniques, and there I was.

WB Had you been trained in those techniques at all?

JN Not open chloroform, no. Chloroform had been given up long ago, but Birmingham was a very thorough medical school, and we had done our 20

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<sup>1</sup> Malcolm Bynoe.

anaesthetics as required by the General Medical Council with great thoroughness and we'd been shown exactly how to proceed and I'd been taught how to pass an endotracheal tube. This turned out later to be crucial because they'd just appointed a faciomaxillary surgeon who couldn't operate because nobody in the settlement could pass a tracheal tube and therefore he couldn't operate on the jaw. So, I said 'Well, I think I could probably manage it.' So I did. We found one tracheal tube tucked away and we cleaned this up, passed it and it worked and after that I was locked into anaesthesia.

WB Because you'd found it fascinating?

JN Well, for many reasons. First of all, I really did enjoy it and secondly, there was a desperate need for an anaesthetist. I think they probably wouldn't have been very happy if I'd asked for a transfer, but most important of all, it meant that I stayed in Penang for the whole three years which was quite unusual. I should have been sent up-country which would have been another story entirely, but I didn't. I stayed in Penang for the whole three years giving anaesthetics.

WB How did you manage to progress from the chloroform method to the tracheal tube?

JN Well, there was very little equipment there. To be quite frank, what I did was pass the tracheal tube under deep ether anaesthetic off an open mask, take an enamelled funnel, stick it in the end of the tracheal tube, stretch gauze over it and sprinkle ether on the gauze. A more basic, primitive method is hard to imagine, but it worked. Well then as I got deeper and deeper into anaesthesia, they started shipping apparatus out for me and eventually we became very well equipped. Meanwhile, I was teaching myself anaesthetics as best I could. I perhaps didn't stress that there was nobody in Penang who gave anaesthetics, I was the only person there, so I had no colleagues with whom I could talk. There was an anaesthetist in Kuala Lumpur, but in those days one didn't venture on the mainland unless one had to because of ambush problems and somehow we didn't get in communication. We didn't seem to use the telephone very much, and I was really totally isolated so I had to teach myself.

WB So, you made a lot of your own equipment?

JN Yes, one made all sorts of things, make do and mend. I got anaesthetic textbooks out and I subscribed to the anaesthetic journals.

WB And really got yourself up to the level of anaesthesia that was being operated in England at the time?

JN Yes, that is so. In the course of the three years, we went through all the various changes that occurred. Now, as you are aware, Cecil Gray was responsible for the introduction of curare and the neuromuscular blocking drugs into British practice and this revolutionised anaesthesia and we actually went through that revolution, I think it was about 1951. I'd carefully read up how to use these drugs which caused total paralysis and abolition of the breathing of course, and the Crown Agents for the Colonies shipped out a consignment of these drugs. Nobody in the colony had ever

seen them used, and on one morning we injected curare into a patient and I said 'Well, there it is, it's in now and we can't get it out.' The patient became totally paralysed and I took over artificial ventilation. By this time we had a rather basic anaesthetic apparatus which we'd found in the stores which I think was left over from the military occupation at the end of the war, and we went through the revolution in anaesthetic practice all in the course of a day or two. The surgeon was totally convinced and said 'This is marvellous. I don't want any more open ether and chloroform.'

WB And how did you manage to control the dosage? Did you know anything about controlling the dosage?

JN Yes. The dosage of the intravenous agents was no real problem.

WB That was established by then?

JN Yes. That was all well established in the journals.

WB So, this must have expanded your surgical experience enormously, this breakthrough in anaesthesia.

JN Oh yes. Then they were able to open chests for instance and work on the oesophagus and so on which hitherto had been quite impossible, and of course the jaw surgery developed a great deal. We were the regional centre for faciomaxillary surgery.

WB So, you found at the end of your three years that you had acquired an expertise that you were going to use for the rest of your life?

JN Yes. It was certainly comparable to anything that was going on in England. I should mention that in the third year, which was perhaps rather late, I was allowed one month's study leave, and I went down to Singapore where there were several anaesthetists and that was a very good period. It was extremely helpful, and I spent the whole month working in the general hospital there.

WB But was there anything that you could learn at that point or were you teaching them?

JN Well, actually one or two things, yes, because I'd gone into controlled lowering of the blood pressure to reduce haemorrhage. I'd worked that up and that was new to Singapore. They hadn't tried that, so I was able to demonstrate it to them, but they taught me all sorts of things and a whole heap of details. It was a very, very valuable experience, but that's the only teaching I had in my first three years which is nowadays unheard of, strictly forbidden of course.

WB And you passed some teaching on, I believe, too?

JN Yes. Well, it was clear of course that I would eventually either be posted, go on leave or resign from the service which is in fact what I did. So, teaching became quite important. They passed to me various locally recruited staff whom I trained in

anaesthesia, one of whom eventually, Dr Bhupalan<sup>2</sup>, an Indian, got the Nuffield Prize for the best results in the fellowship examinations subsequently, of which I'm very proud.

WB Did he remain in Malaya?

JN Yes. He's retired now, but we do see him.

WB So, you can see the effects of your teaching?

JN Yes, I think so, but I would like to stress that there was a proper anaesthetic service in Kuala Lumpur which we never visited, and in Singapore. It was just in the Penang area, so any influence I had was really restricted to that small part of Malaya.

WB What was life like in Malaya with the terrible problems of the Communist uprising?

JN Well, we were all right on the island of Penang. We had a beautiful house overlooking the polo ground which used to belong to the East India Company and was built in 1860. We lived an extremely pleasant life.

WB A colonial lifestyle?

JN Yes, it was. All my senior colleagues were ex-Japanese internees, every one of them, so there was quite a gulf between the senior medical staff and we juniors who had never gone through that terrible experience. The Communists used to have visits to Penang and they would take out people who we suspect were behind in their subscriptions to party funds. So they would send a squad over to Penang and they would carry out a series of assassinations, usually with a .45 revolver at point blank range. So, we had bursts of intensive military surgery activity, and this would go on for about four or five days and suddenly it would stop and we would conclude that the squads had returned to the mainland and then life would be peaceful again for the next six months.

WB But, as British, you didn't feel threatened in any way?

JN No, not really. On one occasion, I did a week on duty in a hill station, and my wife and I drove in our Morris Minor right across Malaya and up into Fraser's Hill, and we actually drove through the ambush site in which Sir Henry Gurney was assassinated just three weeks after we passed through. I remember very clearly driving along clutching a .45 revolver which they'd given me to protect myself against anything which might have happened which fortunately didn't and we went through this ambush site, a very narrow defile, heavily wooded all round. And I said to my wife 'This is the most frightful place. If we were ambushed here, we wouldn't have a chance.' And sure enough, three weeks later, that very site was used.

WB And you still didn't feel threatened?

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<sup>2</sup> Frank Bhupalan.

JN Well, we did on that occasion! No, Penang Island was a little haven in those days. We just had these periodic visits by murder squads and they were entirely concerned with erasing I think former members of the Chinese Communist Party who had lapsed. I think that's what was going on.

WB And your son was born at this time?

JN Yes, he was born in the Penang Maternity Hospital.

WB And that all went well?

JN Yes, it went very well. He's very proud of the fact that he's an overseas doctor.

WB And he's an anaesthetist now?

JN Yes, he is indeed. He's in Leeds.

WB Your social life had improved quite a lot in Malaya, hadn't it? You had a lot of sporting and social entertainments?

JN Yes, I became involved in sailing, there was no mountaineering. Mountaineering was an absolute no-no area for Malaya, and so I just switched abruptly into sailing and I built three boats, dinghies that is to say, one of which was actually a catamaran. We established a sailing club and we used to go racing, and very exciting that was too.

WB And you just taught yourselves again?

JN Yes, indeed, one did.

WB How did you build three boats from scratch?

JN I got the plans out from England and I went down to the Chinese wood-yards, purchased my timber, and of course teak was no problem, and set to work and built.

WB And the sails?

JN Well, my wife made the sails. Yes, that was very interesting that you should raise that. She became an expert sail-maker. The main sail was of great difficulty, but the jibs and the spinnakers ... her spinnakers were absolutely wonderful.

WB Remarkable.

JN Yes.

WB So, you sailed off in these little boats into very dangerous seas? You didn't have any accidents?

JN No, and we had absolutely no safety precautions. There was no safety boat, no flotation, no life jackets, nothing. We just went out in swimsuits and in the sea beneath us there were sea snakes in profusion; sharks, not many fortunately; stingrays that were very dangerous and all kinds of things, but we never had any trouble.

WB Remarkable. You've had a charmed life, I think.

JN Well, I think yes. I mean the switch from Spitzbergen to Malaya was quite abrupt and a different environment completely, each with its own dangers.

WB And then this happy episode had to come to an end and you were back in Birmingham?

JN Yes, at the end of the contract we thought well, we didn't really see a future. What really decided us not to stay was the education of children. We saw people out there whose children were sent back to school in England and this was not a satisfactory arrangement at all and we thought no, no we've got to go back to England. And so, back to England where they said 'Well of course you haven't had proper training out there; you'll have to go back and start at the bottom,' which I did.

WB Really?

JN Yes, I went back to Birmingham which was my old medical school. I'd got my fellowship, I should say. I studied for my fellowship by a correspondence course and I will never sneer at correspondence courses. I sat there working my way through this correspondence course, came back off the ship - I should stress that we travelled by ship in those days which was quite an experience - and as soon as I got off I took the primary fellowship and then three weeks later took the final fellowship. And so I was fully qualified and Birmingham still said 'Oh well, that's all very well, but you haven't had any supervision, have you?' So, I said 'Well, no, I haven't had any supervision at all.' So, they gave me a locum registrar post which is about as low as you can get and then a registrar and then a senior registrar job.

WB But, this was a very heavy workload, wasn't it?

JN Yes, it was. It was one night on in two and, when you were on, the normal was a 15-hour day. It was quite often 18 hours and, on occasions, 24 hours and sometimes one would work right through the night and start again the next day at 9 o'clock. Frankly, that was wrong, and nowadays of course that doesn't happen. It certainly wasn't safe.

WB And as a young man with a small child, you can't have seen your family much?

JN No, no. Although remarkably, we did produce twins at that time, twin girls, born in the Birmingham Maternity Hospital. No, I used to get home alternate weekends. But, even when off-duty, one was expected to remain in the hospital.

WB So, your wife was coping with three children?

JN Yes, she had a busy time, there's no doubt about that, with three small children.

WB But, you weren't particularly happy for other reasons?

JN Well yes, there were other problems. Firstly, I came home with expectations of being taught. Now, instead of systematic instruction which is what was needed, I found that there was what can only be described as an apprenticeship system in which you watched a consultant give an anaesthetic or perhaps he would let you give the next one while he had a cup of coffee, and it wasn't systematic teaching. I rebelled against this and I thought this is not right, this has got to change, people need to be taught properly how to give anaesthetics and watching a consultant simply isn't adequate. That was my first problem. The second problem is that as I mentioned earlier, curare not only relaxes everything but it stops the breathing. Now, having destroyed the patient's spontaneous breathing, you've got to do it for him and I perceived a tremendous ignorance of lung function. I don't know how it happened but at medical school we were really taught nothing about how the lung worked. We were taught about how breathing was controlled in the brain; that was taught in immense detail, and we were taught how oxygen and carbon dioxide were carried in the blood, but what actually happened in the lung was a blind spot. I think it wasn't just Birmingham, I think that was true of everybody. Now, it happens that during the war, bombers were flying at high altitude without pressurisation and crews were exposed to high altitude and the Americans perceived that this was an area which had to be researched. And they assembled a wonderful team of respiratory physiologists, obviously funded them extremely well, and during the war they really established the whole subject of lung function which was something totally new. Now, there we were in anaesthesia with paralysed patients or just beginning intensive care where patients were commonly paralysed and on ventilators with almost no knowledge of lung function under these circumstances. And I felt passionately that we had to investigate lung function under the conditions of anaesthesia and intensive care. I tried to do this in Malaya but it was impossible. The circumstances were hopeless, no university in Penang at that time. During my training time in Birmingham, in National Health Service junior posts, it was also virtually impossible. After a 15 hour day you don't feel much like doing research at the end of that. So, that was the other great cause of unhappiness. There was a problem crying out for a solution; I wanted to have a go at it and I couldn't.

WB Had you mentioned that you wanted to go at it to anybody?

JN Yes. People were aware of it, but they said 'Your job's to give anaesthetic, you know you'll get a consultant job one day.' Nobody took it very seriously.

WB No interest, mm?

JN But then, something quite unexpected happened. It's extraordinary, isn't it, how one's life is changed by purely chance circumstances. I mentioned Sir Melville Arnott who was responsible for us going to Malaya. He was the Professor of

Medicine, a man for whom I have immense respect. He was wandering through the Birmingham General Hospital one morning, going to his outpatients, and I just happened to meet him in the corridor and he said ‘Nunn, my boy, what are you doing now?’ So, I said ‘Would you like to see what I am doing in my research?’ He said ‘Yes.’ So I took him up to my bedroom. It was in a state of indescribable chaos. The bed hadn’t been made and it was in an awful mess, I’d been up all night, and in one corner of my bedroom I’d assembled a small laboratory from apparatus which I had borrowed from the biochemistry laboratory, who were very helpful. There was an antique Van Slyke apparatus which is a huge great glass thing with rubber tubing and mercury and caustic soda, and it was a very old one, and during the night, as it happens, the rubber had perished, the tubing had fallen off, the mercury had escaped and there was caustic soda everywhere. I said that I was trying to do some research on lung function, but I was finding it difficult. Well, Arnott looked at this and sucked through his teeth and said ‘My boy, you cannot carry on like this.’ Then, I don’t know how, but within a matter of six weeks, I was taken out of my job and became a PhD student in his department. I don’t know really what happened, looking back on it. I don’t really understand it, but anyway, that’s what happened. And so I became a PhD student in the Department of Medicine which as it happens was a world leader in lung function. So I was in the best possible environment in the country with leading authorities on the subject there and a completely free hand to do my research. That was 1955.

WB So, you were working towards a PhD?

JN Well yes, that’s right.

WB How long did that take you?

JN Well, about three or four years altogether.

WB What was that called?

JN “Factors Affecting the Carbon Dioxide Partial Pressure During Anaesthesia”. That was it. But that was interrupted too because after I’d been in that post for about fifteen months, a new department of research was opened in the Royal College of Surgeons in London. The Faculty of Anaesthetists in those days was a part of the Royal College of Surgeons and they established a research department of anaesthetics. Ronald Woolmer became the first professor and he advertised for a research fellow. I don’t know whether I was being entirely fair to Birmingham but the lure of London was rather powerful and the facilities were obviously going to be absolutely superb. So, I applied and got the job and off we went to London to this Research Department in the Royal College of Surgeons, with wonderful facilities, and I remained there actually for nearly eight years which is a long time, and during that time I completed the PhD.

WB So you were now really established as the ‘king pin’ if I can put it like that of research in physiology?

JN Well, yes, I think I was probably in a fairly strong position as far as this

country was concerned. I had an opposite number in the United States, John Severinghaus – actually, I say an opposite number, I've always regarded him as my senior in all respects – he had an absolutely first-rate brain and always had wonderful facilities and made enormous advances. He and I became close friends and we visited one another, communicated very freely and have remained friends ever since. But, in England, there were relatively few people in lung function in relation to anaesthesia. Keith Sykes came in about a year or so after me and again we have remained in close touch ever since. Then gradually the subject expanded and the investigation of lung function in a clinical situation became a priority subject. It's interesting to reflect that in those days, an understanding of lung function and working in this field carried a prestige not all that much less than molecular biologists enjoy today. It was a growing point of medical science and it was a very elite and exciting field.

WB And of course it opened up so many surgical fields, didn't it?

JN Yes indeed, yes.

WB Can you describe really the situation before you went to London and shall we say the situation when you were about to leave? How much of an advance had there been in that period?

JN It's hard to say. There were many aspects to it. First of all, there was surgical mortality. Now, there is no question that in the 1950s patients died from respiratory causes who shouldn't have died. With the knowledge that we now have, it shouldn't have happened. It was partly due to ignorance and partly due to the fact that we didn't have recovery rooms; we didn't have intensive care units and monitoring is now so much better than it was. So it was a multi-factorial situation, but the drop in anaesthetic mortality over those years was dramatic. At the moment, it is estimated that 1 in 10,000 patients dies as a result of the anaesthetic. Now, that means that for the average anaesthetist, he will have one anaesthetic related death every ten years of his practice which is such a low incidence that it's almost impossible to investigate. That was certainly not the case in the fifties. So, we feel that we made tremendous progress in that respect, but I would stress again that in addition to research was teaching. The old apprenticeship system of teaching was being progressively more and more supplemented by systematic instruction. Now, Cecil Gray was the great pioneer in this as well as in curare. He established the Liverpool Training Course which was the first. We established one at the College of Surgeons, and the whole emphasis of systematic teaching gradually built up over those same years, so there were many factors all operating at the same time. And I would also like to mention the Anaesthetic Research Society. I was one of the founders of this body. 24th October 1958 was the first meeting and there were only twenty of us; we met at the Royal College of Surgeons and we all read papers to each other.<sup>3</sup> Gradually, this became a large organisation still flourishing today and became the great forum of exchange between research workers in anaesthesia.

WB So, that was a very good disseminating process?

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<sup>3</sup> See John Nunn, 'The first meeting of the Anaesthetic Research Society', *British Journal of Anaesthesia*, 61 (1988), 639-41.

JN It was excellent.

WB Did you find that the attitude you met all around the country and perhaps around the world was changing in favour of your subject? You said it was very prestigious, but were your ideas being taken on board and implemented?

JN I think that's true, yes. I don't think there's any question that respiratory management during anaesthesia and especially in intensive care certainly did benefit from the discoveries which were made. Anaesthesia and intensive care have profound effects on lung function, all of which can be quantified rather well – this is where the mathematics began to come back in again – and one was able to put things on a sound footing. The other factor of course was measurement. Now, the two important factors in relation to breathing are the carbon dioxide partial pressure and the oxygen partial pressure in the blood of your patient. Back in the 1950s, I think one can say, during anaesthesia these were virtually impossible to measure. In late 1958, a rather cumbersome technique came in which just about made it possible to measure carbon dioxide during anaesthesia, but it wasn't in general use and it was definitely a very cumbersome research technique. Then about 1958 my friend, John Severinghaus, who was now in San Francisco developed the carbon dioxide sensitive electrode, now widely known as the 'Severinghaus Electrode' and this made the measurement simple. That was a revolutionary factor. It enabled us to do our original research on the subject using home-made electrodes, and then it passed eventually into routine clinical practice. And now you find a CO<sub>2</sub> sensitive electrode in every department of anaesthetics throughout the developed world, and it has become quite customary now in normal practice to measure a quantity which in the old days was a *tour de force* in a research department. Oxygen partial pressure we can say simply could not be measured until the invention of the polarograph, an electrode again which was sensitive to the partial pressure of oxygen, and this came in round about 1960 and that enabled me to advance into the next series of experiments. I mentioned that the PhD thesis was devoted to factors affecting carbon dioxide partial pressure, and I then embarked on factors governing the oxygen partial pressure which was a far more complicated study using the new polarographic electrodes. I would like to stress that you couldn't buy them of course, you had to make your own.

WB This was where your technical ability came in?

JN Well that's right, yes.

WB You were still making equipment?

JN Yes. We had a very good workshop in the College of Surgeons and one actually made one's own electrodes. I remember very well fusing platinum wire into lead glass and grinding the glass smooth and getting the electrode working. A lot of time was spent calibrating, checking of accuracy and so on.

WB So, can you tell me what essential difference this made to the patient? From the patient's perspective, this had changed beyond belief?

JN It meant that you could control the state of oxygenation of the patient and I suppose it's probably true to say that most patients die from oxygen lack. First of all, you knew the factors which influenced the oxygen level of the patient and secondly, you eventually had a technique by which you could measure it yourself and keep it under control. Now, it's hard to say how far that influenced mortality. All one can say is that mortality fell dramatically while these developments took place. Now, whether it was *post hoc* or *propter hoc* is impossible to assess in retrospect because at the same time I would stress that systematic training and teaching, good textbooks were becoming available and there were many factors.

WB You were very much responsible for encouraging teaching and widespread implementation of teaching was taking place, partly because of your unhappy experiences in Birmingham. What particular teaching methods did you install?

JN Well, first of all may I just say that Birmingham was not unusual in this respect. In the early 1950s, apart from Liverpool, there were very, very few systematic training courses for anaesthetists anywhere in the country. It was a general problem affecting the whole country and I dare say the United States as well, although I can't be too certain about that. During my long period as a research fellow, I spent most of that as, I think the term is, 'an angry young man,' saying 'Something's got to be done.' And we all used to meet over meals and coffee and have a beer or whatever and say 'Something must be done.' So, we started in the Royal College of Surgeons. They ran courses. This was through the Faculty of Anaesthetists and we made a very good start there, but the courses only covered about fifty or sixty postgraduate students each time, so it was only a small proportion of the country as a whole. The next stage was to get systematic teaching disseminated into regional and hospital levels and that had to wait until a later stage in my career as far as I was concerned.

WB Was there any undergraduate training?

JN Yes, undergraduate teaching was very variable. The commonest pattern was about two weeks in the fourth or fifth year. Universities varied a great deal in how seriously they took undergraduate teaching. Birmingham, as I said, were very systematic and they made sure that you did at least know how to sit down and give an anaesthetic if you had to: that was typically Birmingham. I can't really say what happened in other medical schools, but I believe many medical schools didn't take that two weeks any too seriously.

WB At about this time you were approached by Leeds?

JN Would you mind if I just mentioned one small point which I think is interesting? Apparatus; anaesthetic apparatus. I was never deeply involved in the development of anaesthetic apparatus except on one rare occasion. Sir Vivian Fuchs came in one day and said that there'd been an anaesthetic disaster in the Falkland Island Dependencies in Antarctica. It wasn't I hasten to say the British, it was another group, and unfortunately their leader had died under an anaesthetic. Could I possibly look into the question? With the Spitzbergen background which was helpful, I knew the difficulties of the terrain and I devised a totally new approach to the provision of a high oxygen mixture which was to use a Venturi tube in which a basal stream of

oxygen of one litre a minute would entrain room air to give something like seven litres a minute total of thirty per cent oxygen. I would stress that going from twenty one per cent oxygen, the normal concentration in the air, to thirty per cent gives huge safeguards, it really makes a tremendous difference, and this could be done with the Venturi device at great economy of oxygen. A small cyclinder about the size of a one-litre milk bottle would be sufficient for six hours of anaesthesia and this was the first time the Venturi had been used for medical purposes. Now, this was taken up by my friend, Moran Campbell, who then developed the Venturi mask which is now widely used for the provision of high oxygen mixtures to patients. But, the Antarctic apparatus was actually the introduction of the Venturi into anaesthetic practice.

WB So, that is applied all over the world now?

JN The Venturi is, yes. They're widely used and the entrainment ratios are very constant. Then we made a high altitude version of this for use in the Himalayas. Now, you need something like sixty per cent oxygen in air because at high altitude mountaineers have to breathe at very high rates in order to compensate for the reduced oxygen partial pressure. An anaesthetic under these circumstances is fraught with danger because anaesthetics depress the reflex which is responsible for hyperventilation under the circumstances of hypoxia and there are plenty of records of an apparently simple anaesthetic at very high altitude which has been life-threatening. There was a big Himalayan scientific expedition going off about that time and so we had a go at this and we developed a modification of the Venturi which would deliver high concentrations of oxygen. This was tested, I think it would have been about 1962. Professor Woolmer and I and Michael Ward, who is a surgeon but also a distinguished mountaineer who went on this particular expedition, went off to the high altitude chamber at Farnborough to test it. Looking back, I don't think this would have got through the Ethical Committee. They pumped us down to half the atmosphere pressure, equivalent in altitude of about twenty thousand feet, whereupon we anaesthetised one another in rotation, the three of us. So the first person having recovered from the anaesthetic would then rest for a few minutes and shortly afterwards he would anaesthetise the next person and we all anaesthetised each other very successfully and then off we went for a gin and tonic and lunch in the Officers Mess.

WB So, two of you were observing the reactions of the one who had been anaesthetised?

JN That's right. One of whom, later on both of whom, had just been anaesthetised.

WB And no ill effects?

JN No, it worked a treat. This particular type of anaesthetic apparatus was used extensively and has worked wonderfully. I should mention that we did actually experiment on one another to a remarkable extent in those days.

WB Did you?

JN Oh yes. One of the effects of anaesthetics is a reduction in lung volume and one was able to study this in volunteers breathing at low lung volume.

WB Volunteers amongst the doctors?

JN Well, it was mostly ourselves. I've been the subject of innumerable experiments. In fact, there's a little scar on my wrist where the needle goes into the artery.

WB Really?

JN Oh yes. We all worked on one another. Often, it would be that the three investigators would be the three subjects.

WB And you've never had any problems?

JN Thank goodness, no.

WB That's remarkable because you've followed in a long tradition of anaesthetists performing experiments. People like Pask did that sort of thing regularly, didn't they?

JN Yes, of course there were extraordinary tales of Pask. During the war, he was involved in research in such areas as parachute harnesses, you know, how long one could dangle in a parachute harness without running into breathing problems. And even more dramatic with Sir Robert Macintosh, which way up you floated when unconscious with different patterns of life jackets. They would anaesthetise one another, put on the life jacket, and then throw them into a swimming pool to see which way up they floated. Now, again, I don't see that getting through any Ethical Committee, but they did it.

WB How are things now proceeding then if people can't do this sort of thing?

JN Well, it's a problem. It is a real problem – there is no doubt. There are certain things you simply cannot do. There are many little unanswered questions in medicine where we have to say quite frankly this cannot be investigated.

WB So, that's really rather holding back some progress?

JN Really it is. Yes, it must inevitably be so.

WB Well, we're very grateful to all those who have been heroes and thrown themselves into these difficult situations. Obviously, it's been of great benefit.

JN Well, they were exciting days, I must say. It was full of interest.

WB So, you enjoyed this period at London very much?

JN Yes. The College of Surgeons was tremendous. We were very well funded. The College was actually a very wealthy body in those days, they had just had an

enormous bequest and we really lacked for nothing, except patients of course. We would devise a study on patients, load everything into a furniture van, go off to a neighbouring friendly hospital, carry out our study in that hospital and then come back and digest the results and plan the next study.

WB But I believe all through your life you've treated patients every week. So, how did you manage that at that time?

JN I had honorary contracts. The Whittington Hospital first and then the Hammersmith. Yes, I've always, throughout my research period, had one solid day a week on which I just gave anaesthetics and functioned as an ordinary anaesthetist which I must say I've always enjoyed.

WB You like the patient contact?

JN Yes. I love the patient contact and I see them all the night before and sit on the bed and talk to them. Giving anaesthetics is a very, very satisfying occupation. You feel you are really helping people.

WB That's interesting because some anaesthetists appear to have gone into the profession because they actually don't like too much patient contact.

JN Yes, that's true.

WB And they can go away at the end of the day without relating too much.

JN Yes. My daughter-in-law who is a general practitioner doesn't really regard my son and myself as real proper doctors, she regards us as some sort of technicians. She's quite wrong of course, quite wrong.

WB That's good. So, what tempted you away from London?

JN Well, this again was one of the factors which just happened. I was sitting there minding my own business and in comes John Goligher, the Professor of Surgery at Leeds, who I had never met in my life and he just said 'We know that in due course you are likely to finish up in the Medical Research Council, but the University of Leeds has decided that they are going to establish a Chair of Anaesthesia. If you would like, we would be very happy for you to come and be our first professor for the next few years.'

WB This was a great honour, to be the foundation professor.

JN That's right. That was a tremendous shock. I remember going home absolutely dazed to tell my wife who nearly fell off the chair, and I said 'Well, I'd better go up, you know, be polite.' And so I went up to be polite and they offered me just about everything you can think of including a proper salary, because research fellows' salaries of course were not very good, and I'd been a research fellow, and our son was just about to go to Epsom and we weren't quite sure how we were going to manage. Leeds was generous beyond any belief and I remember coming back from

the interview at midnight, staggered into the bedroom and told my wife what they'd offered me and she said 'We've got to go.' I said 'Yes, we've got to go.' So, off we went.

WB But, it wasn't just money. It was the team and the facilities?

JN Yes, it was what they offered, you see. One was on a professorial salary which was a lot better than a research fellow. Then secondly they gave me an enormous research grant for setting up the department, in modern terms it would be huge. It was, if I remember correctly, £15,000 in 1964 which was wealth beyond dreams. Then they allowed me a very large number of staff. I was able to recruit some outstanding people, and I had a free hand to do just about what I liked. They allowed me access to the undergraduates for teaching and I was able to set up a postgraduate course very much along the lines of Cecil Gray's course in Liverpool, and the research facilities were superb.

WB So, what were you mainly working on at this stage?

JN I was still on respiration. Respiratory physiology had a good long way to run as far as I was concerned, but I had a PhD student, Cedric Prys-Roberts, later professor in Bristol and president of the Royal College of Anaesthetists. He branched out into circulatory physiology. We had a total of four members of staff who became professors, which is quite remarkable, I think.

WB And you were only there for four years, weren't you?

JN Yes, only four years, and then the Medical Research Council was actually starting to build their Clinical Research Centre in Harrow at Northwick Park Hospital and that's where I felt my destiny laid.

WB Why did you feel that it was better than staying in Leeds?

JN It's a good question and I often wonder in retrospect how life would have been different if I hadn't taken the decision to go. I suppose the great attraction of the Clinical Research Centre was that it wasn't just a new department, it was a new institute and it started off with tremendous optimism. There was to be a brand new district hospital of eight hundred beds and alongside it a brand new research institute with a total of about two hundred scientists, and the possibilities there for research were immense. I was in on the early planning; I used to make trips down from Leeds for the early planning. I designed the operating theatres with the architects and the intensive care unit and I felt very much involved. Also, I was absolutely devoted to the designate director, John Squire. Tragically as the first sod was turned to build it, he died of a coronary. This was a tremendous disaster. But, I felt a great sense of identity with the Clinical Research Centre. Of course it ends up a sad story, but at that time it was all optimism and I had the opportunity of establishing an NHS department of anaesthetics from scratch appointing every person and also building up a large research department.

WB Again with all the facilities that you needed?

JN Yes, our facilities were outstanding, better even than Leeds. And everything new.

WB And the patients, right to hand?

JN And the patients. Well, we used to live in Pinner which is down the road, so I knew Harrow very well, and the patients of Harrow are probably the best patients in the world to anaesthetise, they are most delightful people, and the best people for research. They were terribly nice, co-operative, friendly people and they'd say when we were explaining the project 'Don't bother telling me what you are going to do, you just do it, we have complete faith in you. I'm very happy, you just go ahead.' And we had of course our laboratories integrated into the hospital, I designed this, and we had laboratories within the theatres, we had laboratories within the intensive care unit, we had animal facilities. It was excellent. It was probably the best anaesthetic research facilities and buildings in the world. So, with great sadness we left Leeds, but we retained an enormous affection for Leeds because they were wonderful people and they did everything that I could possibly have wished, and now astonishingly my son has gone back there. He is a neurosurgical anaesthetist in the Leeds Infirmary, so the family link has been preserved.

WB That's very good. What did you feel on leaving Leeds, what did you feel had been your major achievement at that point?

JN I would say three things. First of all, we'd broken new ground in undergraduate teaching. We arranged that a group of fourteen students would come to us for a fortnight and these fourteen students had tremendous individual attention. Each one of us took over responsibility for two of them and this fortnight assignment only applied for about half our time. There weren't all that many medical students in those days, only about seventy in a year, so it came as an isolated little pocket when we really dropped a lot of other things and we concentrated on these students. We taught them how to assess a patient pre-operatively which we knew they would need in general practice, we taught them how to give an anaesthetic if they had to, we taught them how to give a dental anaesthetic because that's something they had to do, we taught them resuscitation in great detail and on the whole I think we gave them a first-class experience, but at considerable cost to ourselves. Now, with the large number of students you get today, I'm not sure how far this would be possible, but we did in fact provide them with an excellent experience. Many of them have come back and said that this was one of the best experiences of the undergraduate time, but as I say, at substantial cost. Secondly, we set up the postgraduate courses very much along the lines that Cecil Gray had pioneered: we devoted the whole of Wednesday to lecturing, basic sciences in the morning, clinical anaesthesia in the afternoon, two separate courses going in parallel during term-time and that was very good. Incidentally, we pioneered the use of television for teaching. There was a very strong television department in the University of Leeds at that time. It was one of the great strengths of the university and we had closed circuit television on which we were able to demonstrate things like laboratory techniques and that was exciting. The third aspect of Leeds was of course the research. I'm very proud of the fact that four of the staff became professors. We published an enormous amount of work and it was very

successful. But, I would like to pay special respect to John Goligher. I spent Mondays anaesthetising for John Goligher and he was the most marvellous man. He was a gastroenterological surgeon, a specialist in the bowel, the large bowel particularly, and working with him was a real privilege.

WB So, you've always had a very close collaborative working life with surgeons, haven't you?

JN Yes, I have. I have been terribly fortunate. I look back with great pleasure on the fact that I've given anaesthetics for one president of the Royal College of Surgeons, three vice-presidents of the Royal College of Surgeons, and countless professors of surgery. I've worked with some very distinguished surgeons and I've always found the relationships very happy, because sometimes it can be difficult, you know, but I've never had that experience.

WB How did you shape your day at the MRC? You had so many irons in the fire. I believe at this time you were dean of the Faculty [of Anaesthetists].

JN No, that came a bit later. I had ten clear years before that fell upon me. So, those were the ten formative years. What I think I would especially like to stress is first of all the Medical Research Council staff and the National Health Service staff in anaesthesia were closely integrated, and we were almost the only branch of medicine at Northwick Park to establish this close collaboration. The NHS people were all former academics, and we specifically appointed people who had deep interests in research. A remarkable fact is that of the National Health Service juniors, eight became professors. Now, I think it's unheard of that eight juniors from any National Health Service hospital should eventually become professors, but there was a very strong academic background on the NHS side. We on the Medical Research Council side all took full part in anaesthesia. We were so closely integrated that the nursing side didn't know who were the employers of whom and that was important I think. Now, the facilities for research were, needless to say, absolutely superb. We just simply had to wheel our material down the corridor. The third thing which we did which was very important was that we were all passionately devoted to the concept of proper teaching, so we set time aside and we taught our juniors systematically. We also involved most of the juniors on the NHS side in research projects. I think fifty-seven NHS juniors were drawn into research projects which is quite remarkable. There were one thousand publications all told while we were there.

WB On mainly?

JN Well, my own little group for which I was responsible was primarily respiratory. And then as the respiratory areas became perhaps, 'worked out' I think is the phrase one has to use, I moved across into the interaction of nitrous oxide and Vitamin B<sub>12</sub> which had only recently been discovered. This was completely new ground for me and I found myself thrust into some very, very complex biochemistry, but it did appear that the supposedly inert gas, nitrous oxide, could inactivate Vitamin B<sub>12</sub> and this had all kinds of potential consequences.

WB How had that been noticed?

JN Well, it was actually reported at a congress in Turkey and the haematologist, Israel Chanarin, who became a great friend of mine, came along one day and said 'What about this?' And I said 'Well, it's absolute rubbish, you know, nitrous oxide and Vitamin B<sub>12</sub>, it just doesn't happen.' So, then he said 'Well, we'd better look at it.' So, we set to work with joint studies and sure enough, there it was. It was inactivation of methionine synthase with potential and serious consequences such as megaloblastic anaemia and subacute combined degeneration of the cord and the possibility, of course, that nitrous oxide could produce foetal abnormalities in pregnancy when nitrous oxide was administered. At about that time that had been reported by a colleague in the United States. Now, we ran parallel studies in rats and in man and made the discovery that whereas the action was very rapid in rats, it was extremely slow in man and also required relatively high concentrations. So in fact it was not a serious problem for an anaesthetic of less than, shall we say, four hours duration, whereas in the rat changes occurred extremely quickly. I became interested while I was in Leeds on the effect of anaesthetics at the cell level, particularly the dividing cell. I'd collaborated with the department of botany anaesthetising bean roots and showed that there were grave changes in the process of mitosis as a result of anaesthetic interaction. Now, we were able to follow that up, I was able to recruit Jean Sturrock who worked with us for three years, and we were studying mammalian cell cultures and the effect of anaesthetics on the dividing cell. There were profound effects; a quite low concentration of anaesthetics did actually interfere with the division of cells.

WB Really?

JN Yes. Now, that was a completely different field, but one which I found very stimulating.

WB What are the applications of that?

JN Again, the question is foetal abnormalities. You see, there is this great fear that female anaesthetists might have an increased tendency to abortion and to foetal abnormality. This had been put forward by various groups working abroad, and in fact has been investigated in depth by a former colleague from Leeds, Alastair Spence. A big Medical Research Council study involving pretty well every female anaesthetist in the country, has shown that, in fact, over ten years, the risk is minimal. If it's present, it's comparable to that of smoking one cigarette a day, so in fact it isn't a serious problem, but you know what it is with contamination and the Health and Safety Executive, these things have to be investigated. Then the last thing before retirement, I became involved in the control of the airway. I was very fortunate to meet Archie Brain who introduced the laryngeal mask, and this I thought was one of the big events of contemporary anaesthesia, the completely novel approach of a mask which is passed down the throat and homes in on the larynx and forms an airtight seal without the necessity to pass a tracheal tube. We investigated this in great depth with the collaboration of the radiology department and that was one of the last things which I did, but one which I feel was important and well worth doing.

WB I think you have a good story about how he demonstrated this [mask] to you

initially?

JN Yes. Well, actually he was thinking of applying for a job at Northwick Park Hospital and he came into the theatre where I was. He didn't actually apply for the job in the end but he thought he might, and I said 'I think I know your name actually, didn't you invent a new device for airway control?' because it was completely unknown at that time. So, he said 'Yes, in fact I have it in my pocket here.' And he pulled it out of his pocket and proceeded to pop it down the patient I was anaesthetising. I was just holding a mask on this patient and he just popped it straight in, perfect airway. I said 'Absolutely magnificent.' Then he said 'Well, I've got to go now.' So, I said 'Well, you're not going to take that with you, are you?' And he said 'No trouble.' So, he passed a tracheal tube down through it, pulled the mask out, and left me with the tube in and popped out through the door, and I was absolutely dumbfounded by this. So impressed were we by this that we did the first pilot study of this device. He gave us a supply of these masks and we issued them to our colleagues and said simply 'Poke this down as far as it will go, blow up the cuff, and see how you get on.' And we found to our amazement, in ninety eight per cent of cases, there was absolutely no problem of any sort.

WB Hadn't he made the original cuff out of something rather odd?

JN Well, it was all home-made, they were all home-made. He'd made about one hundred prototypes, all of which were home-made.

WB Had he been trying to get these implemented, or had nobody really come across it?

JN Well, it hadn't really got off the ground and then our paper appeared and according to Archie, this was the start of the whole thing. Now of course they're in I suppose every country in the world and this has been the biggest revolution in anaesthetic practice for a long time, comparable I think to Sir Ivan Magill's introduction of the endotracheal tube back in the 1930s. So, that was very exciting and we enjoyed that project enormously.

WB Then after the first ten years, you became dean of the Faculty?

JN Yes. I'd been on the Board of the Faculty and then each March we'd vote for the next dean, nobody knows who's going to be dean, and by jove I came up and there I was, dean! So, I rang up the Medical Research Council the next day and said 'Look, I've been elected dean of the Faculty.' And they said 'Oh, you can't do that, you can't do that. We don't pay you to do that sort of thing.' So, I said 'Well, what do you expect me to do about it?' And then after a bit they said 'Well, you'll have to do it, won't you?' And I said 'Well, I really do.' So, I had three years then as dean of the Faculty of Anaesthetists. Now, I don't really enjoy political activity at all. I'm really an eternal student, and I like investigating and research, and I like bringing on junior people in research, those are the things that turn me on. And sitting there as dean was not quite my scene, but I did my best. They were three very interesting years and that involved responsibility. It was the national controlling body in anaesthesia, responsible for education, for running the Fellowship examination and thirdly, for

inspection of hospitals which of course was very interesting because one had the opportunity of seeing just how teaching was progressing in individual hospitals.

WB So, this was real quality control.

JN It was the quality control of anaesthesia and the certifying body.

WB And did you ever find any alarming practices?

JN Yes. Occasionally, one found that education of juniors was sometimes deficient. On one occasion we withdrew recognition of a hospital for training junior staff quite abruptly. We said 'This has got to stop and until you do something about it, you can't continue.' Which meant of course that they couldn't recruit juniors and it was a serious matter.

WB So, what happened to the hospital when you did that?

JN They appointed three new consultants, revamped everything, we re-inspected and then everything resumed play.

WB So, it was quite a lethal weapon?

JN Oh yes. The College has tremendous powers and it was a job of enormous importance, but it took two and a half days a week. I recorded every hour I spent there and now the job has risen to, I think it's three and a half, if not four, days a week. And one wonders indeed how on earth the people who are appointed to these offices are going to handle their job back at their university or whatever.

WB But at least you could further your interest in education?

JN Yes. Now, that was good because I had this passionate interest in education and we developed the college courses and they became very good. And then they attracted more and more juniors and now there is a tremendous education programme.

WB What did the college courses consist of, mainly?

JN There was a course for the Primary Fellowship which was basic sciences and then another one for the clinical aspects of anaesthesia. But then, in my time as dean, we expanded the examination into three parts. I wasn't entirely happy about this. I felt three exams was pushing it rather on the juniors, you know, it was rather a lot. We had a first exam which was clinical competence, the idea being that you root out people who are clinically incompetent before you go any further and you can't easily refute that argument. Then, the second exam was basic sciences and they had to go back and learn the basic science of the subject, and the third exam was what you might call specialist anaesthesia.

WB And are you happy with it now?

JN Well, it's changed again. They now combine the first two, so now the first

exam is clinical competence tested by all sorts of modern techniques and the basic sciences as well, so that is an enormous hurdle, and then the third part is specialist anaesthesia.

WB Now, you've had very many other honours apart from becoming Dean, which of them has given you the most pleasure, shall we say, to receive?

JN Heavens, that's hard to say! Well, all sorts of things fell upon me. My tax inspector one day said 'You haven't claimed for membership of learned bodies this year.' And I wrote back and said 'Well actually, I've been made an honorary member of every one of them, so I don't have to.' I'm an honorary member of just about everything including the Royal Society of Medicine. Now, not many anaesthetists are honorary fellows of the Royal Society of Medicine and that I appreciated. Many overseas societies: the Japan Society was in particular the unusual honour, and the Americans and many different countries. Then a large number of eponymous lectures which I gave, visiting professorships all over the place.

WB Aileen Adams has said that you more or less single-handedly developed respiratory physiology. Would you think that most of these honours were given to you specifically for your work in that field?

JN Yes, I think that is probably true – the bringing of applied respiratory physiology into the field of anaesthesia; well shall I say I started it in this country. I mean, a lot of people came into it later on, but I think I got it started.

WB Does that give you great pleasure in retrospect?

JN Yes, it does. It was a wonderful field as I said. In those days it carried the prestige which is now accorded to molecular biology, we were a special elite group. We were displaced I should say fairly soon after that by the immunologists and then the molecular biologists of course have now taken the whole of the limelight and I often tell them that one day something else will take over from them, but they don't believe me.

WB And alongside all your research and your very busy life, you've managed to write several books, well many books. You wrote in conjunction with Cecil Gray I believe initially, started perhaps with him?

JN Yes, I think that is true. Cecil came along very early and said would I write some chapters for the books which he was editing and then he and I edited 'General Anaesthesia' through editions.<sup>4</sup> And then eventually he retired from it and it became Nunn/Utting – who was the next professor in Liverpool. And then I brought in Burnell Brown from Arizona so that we had an American side to it. That was the 1989 edition. Then I retired from that and now it's Prys-Roberts, who I have mentioned earlier, and Brown, they've done the most recent one which is 1996. So,

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<sup>4</sup> TC Gray, J Nunn, *General Anaesthesia*, (3<sup>rd</sup> edition), London: Butterworths, 1971; TC Gray, J Nunn, JE Utting, *General Anaesthesia*, (4<sup>th</sup> edition), London: Butterworths, 1980; J Nunn, JE Utting, BR Brown, *General Anaesthesia*, (5<sup>th</sup> edition), London: Butterworths, 1989

that book continues.

WB And your 'Applied Respiratory Physiology'?<sup>5</sup>

JN Yes, that's my real solo work. That started in 1969, that's the first edition, which you have here actually, it's a sort of historical relic now, but this was the first edition and then it was called 'Applied Respiratory Physiology with Special Reference to Anaesthesia'. And this was setting out for the anaesthetist what was known about lung function that had relevance to anaesthesia. That went very well, and we had a second edition in 1977, a third edition in '87 and then the fourth edition which is here and you'll note that the title has now become 'Nunn's Applied Respiratory Physiology,' and that's going to remain. The fifth edition which I am not writing and is being written by my colleague Andy Lumb, is going to be 'Nunn's Applied Respiratory Physiology by Andy Lumb'. That was all with Butterworths. I had a long association with Butterworths who were absolutely superb. Delightful publishers just up the road from here, of course.

WB And you are only not doing the fifth edition because you retired in 1991?

JN Oh yes, I retired in 1991 and I took the view, which is not everybody's view I know, but I belong to a school that believes that on retirement you get out and let other people carry on and you go off and do something else. I really didn't want to hang on once I'd lost my department because the point I should stress is that I retired in 1991 and in 1993 the Medical Research Council in its wisdom decided to close the Clinical Research Centre.

WB Did you know that was coming?

JN Oh yes, we knew that for quite some time, with approaching dread, and I had the horror of seeing the whole institute totally destroyed with everybody scattered.

WB Really?

JN Yes. I haven't mentioned, but should have mentioned, Michael Halsey. Now, Michael Halsey joined me in 1972. He is a physical chemist, but deeply involved in the biological field. He's an Oxford man, but I recruited him from San Francisco, and he joined me. His speciality was diving. Now, high pressure and anaesthesia are, believe it or not, antagonistic to each other. Anaesthesia reverses some of the effects of the high pressure nervous syndrome and on the other hand high pressure will actually reverse some forms of anaesthesia. So, this was an area which needed exploitation. Gradually, Michael developed his own group. It was an autonomous group within my department, but employing about ten people, working at pressures up to one hundred atmospheres which is a very, very high pressure. And he of course didn't retire, he is younger than I am, and he was dispersed in 1993. We had this great diaspora in which everybody who was still working was scattered to the winds and he then came to Oxford.

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<sup>5</sup> J Nunn, *Applied Respiratory Physiology with Special Reference to Anaesthesia*, London: Butterworths, 1969

WB So, all over the country there are the...

JN Isolated pockets of former Clinical Research Centre staff, yes.

WB That must have been very sad for you to see all that work broken up?

JN Oh, it was very sad. It was seeing one's department demolished and one's records had to be destroyed, you see.

WB Really?

JN Well, you can only store so much at home.

WB Oh dear. What a shame.

JN It was very sad, yes.

WB Do you feel looking back that that was the wrong route to go down?

JN Oh absolutely, yes. I think the whole concept of a clinical research centre allied to a district hospital was right in the first place, but as you know well the clinical sciences now are having on the whole a rather bad time. The emphasis is now on neurosciences, cellular biology, epidemiology, and molecular biology of course, and many clinical chairs in universities are not being continued. We built up in anaesthesia to, I think its about twenty-five professorial departments of anaesthetics and we are concerned as to whether these will continue.

WB They are still there at the moment?

JN They are still there at the moment, yes, but there are a number of people retiring this year who are uncertain about the continuation of their departments.

WB Do you think that these professors need to be replaced, in the sense that I think you feel that anaesthesia has progressed so far that it is now needing, shall we say, less research in the future?

JN Yes. There is this question of have we been so successful in anaesthetic research that we've done ourselves out of our jobs by reducing the anaesthetic mortality to a level at which you can barely investigate it. There is truth there, but on the other hand, clinical professors have a vital role in teaching, and I'm very concerned at the reduction in the number of clinical professors. I don't think this is the right way to go.

WB And you think that this is actually going to affect the teaching courses?

JN Its a question of whether hospitals can pick up the teaching responsibility without the presence of a professor and whether the college can provide it at the national level. It's conceivable that it will work out, but the era of the great clinical

professors many people feel is gradually drawing to a close, and I for one am very uneasy about this.

WB Yes. What would you do? Would you have kept the status quo or would you have changed it a bit in some way?

JN I don't know. As I have said, once one is retired, one isn't in full knowledge of the circumstances, particularly the financial constraints which I'm sure are of major importance. And the main thing is getting good research grants from the Medical Research Council and from Wellcome, which is the criteria by which professors are now judged. This is much easier in the basic sciences than in the clinical sciences. This is the real fundamental problem, that molecular biologists, epidemiologists and cell biologists bring in the big grants, and the clinical people find it difficult. And the university now pays so much attention to the grants which a professor is able to bring in.

WB However, in retirement, you have been extremely busy, going off on a quite different tack, a slightly different tack?

JN As I have said, I feel quite strongly that on retirement one should really go and do something else. You don't know how long you are going to be in possession of a modicum of neurones and it's fun to go and do the things that you hadn't time to do before. Well, I've had this long interest in Egyptology. I've been learning the Ancient Egyptian language since 1972 and fortunately have had two of the best teachers in the country.

WB How did it come about that you wanted to learn about it?

JN Well, it's hard to say. My father was in Egypt when Tutankhamun's tomb was opened, and he was actually there, and that was rather exciting, so we've always had a sort of family link in that respect, but I just gradually got drawn into the language. It was the language which appealed to me and then by sheer chance my secretary's cousin was Cyril Spaul, a distinguished Egyptologist, in Cambridge, an amateur actually, and he offered to take me through the grammar. So, I went through Sir Alan Gardiner's Egyptian grammar with him on a postal basis over seven years. Then after that I felt I needed the stimulus of a course and then I joined Carol Andrews' class. Now, she is a curator at the British Museum, and I've been with her ever since: she runs classes once a fortnight and takes us through papyrus after papyrus after papyrus, and now the problem is finding something we haven't done. And it's an enormous stimulus.

WB But you're very interested in the medical aspects, aren't you? So did you go from the, shall I say the ordinary papyri to the medical?

JN Exactly, yes. As one became reasonably competent with Middle Egyptian which is the period in which the most important medical papyri appear, I started looking at the medical papyri and got deeper and deeper involved in them. And then just after I was retired and wondering really what I was going to do, along comes British Museum Press and offered me a contract to write this book which you see

here.

WB 'Ancient Egyptian Medicine'.<sup>6</sup>

JN Well, that was three and a half years of really intensive work.

WB And goes back how far in time?

JN Well, probably I would say about 2,500 BC. You can't do very much before that.

WB And are you charting it historically, the progress of Ancient Egyptian medicine or are you just discovering whatever you can as you go along?

JN No, it's a very systematic book. It's written much as one would write a PhD thesis, you see. I start off with the Geographical Background, how Egypt influenced medicine which is fundamentally important, and then there's a whole chapter devoted to the Medical Papyri in which I list them all and describe them and what they cover. Then the Concepts of Anatomy, Physiology and Pathology; then the Pattern of Disease – this is palaeopathology of course; and then Magic and Religion which is an important aspect. Then the Healers in which I've listed one hundred and fifty four doctors, the largest number ever assembled; Drug Therapy; and then Surgery; Dangerous Animals; and then Specialised Branches. And then an Epilogue in which we tail off through the Macedonian and Ptolemaic period into Coptic Egyptian and then it merges into Arabic medicine.

WB And now you are the world's expert?

JN Well, I don't know about that, but I've certainly had an enormous follow-up from the book in terms of broadcasts and that sort of thing, and a huge correspondence which is almost a full-time job.

WB Have you learnt something yourself from their medicine?

JN Ah, that's a very difficult question. They certainly did certain things extremely well. I have to say on the whole one has not come across things in Ancient Egyptian medicine that one feels should be introduced into British medicine now. One has to say that. What is interesting is what they did manage to achieve.

WB With very little. But, you made a lovely remark about how when you were a young man you only had to know about nine drugs. Was it rather similar?

JN Yes, that's right. Melville Arnott said 'You only need nine drugs.' And he listed the nine drugs and that's all you need to carry in your little black bag. And then as a student I learnt how to make a bottle of medicine and then I realised that the bottles of medicine we mixed contained no active ingredients at all, and that they were not unlike the prescriptions of Ancient Egyptian medicine. And then it gradually

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<sup>6</sup> J Nunn, *Ancient Egyptian Medicine*, London: British Museum Press, 1996

dawned on me that medicine has changed since 1950 far more than it changed between ancient times and, shall we say, Victorian medicine. The big changes are all so recent.

WB Yes, yes. And you've lived through a very exciting period?

JN Yes, I've lived through a revolution in medicine: all my generation has, and it's been very exciting, yes.

WB And looking back, do you have one major achievement or, shall we say, one or two that give you huge satisfaction and pleasure?

JN Yes, I think the achievement of which I am most proud of all is that twenty-two of my junior associates have become professors, two have become presidents of the College of Anaesthetists, one has become a vice-president and it's bringing somebody along and seeing them have a successful subsequent career, I think that is probably the most satisfying aspect of everything I've ever done.

WB Well, that's a very nice note on which to end. Thank you very much indeed.