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**Professor A L Cochrane in interview with Max Blythe
Rhoose Farm, South Wales, September 1987**

Part One

MB Professor Archie Cochrane has played a major part in the development of epidemiological sciences in Britain, internationally in fact, and it is a great pleasure to have the opportunity to talk with him about the various aspects of his work, to go over the historical developments of his career.

Archie, how did you start in medicine? How did it all happen?

AC Well to begin with it wasn't all that clear. I come from an upper middle class family. My father was a tweed manufacturer in Scotland and was killed in the first world war. My mother came from a legal family in a neighbouring town, Hawick, and I was educated very happily at a preparatory school in North Wales and then by some curious chance won a scholarship to a school I'd never heard of called Uppingham. There life was very different. Reggie Owen, the head, was a great believer in corporal punishment and they believed very strongly in the importance of games. Fortunately I played rucker rather well so I got off lightly in many respects, but on the other hand there were some very good teachers there; one the science teacher E T Saunders, and an English teacher, T B Belk, to whom I owe a great deal. I think it was from E T Saunders that I got a desire to do scientific research work, either biological or medical. At the beginning it was vague, but by the time I reached Cambridge I was determined to do scientific research in either the medical or biological fields.

MB So you went up to King's College, Cambridge...

AC Yes. I was lucky enough to win a scholarship, very lucky.

MB To read Natural Sciences?

AC Yes.

MB Can you tell us about your days in Cambridge?

AC I remember an interview with my tutor there in the very early days. I told him I was interested in doing biological research and mentioned physiology and biochemistry, and then, unfortunately, mentioned medicine and he rose from his chair and said 'Cochrane, if you wish to study a trade you shouldn't come to King's, you come here to be educated.' I shut up rather rapidly. And I dithered about medical and biological research....and took my second MB early in my fourth term at Cambridge, as a sort of insurance policy, and passed it easily. I believe I was top in anatomy, which has been of no value to me in the rest of my life at all.

MB What happened thereafter, what happened about the medical career?

AC At the end of my four years, when I got a double first, I decided to do purely biological research and I actually took up a programme in tissue culture.... and this part of my life was very much clouded by my discovery that I had a very rare sexual defect and I made my first contact with the medical profession who were neither sympathetic or very helpful. At that period they didn't like talking to young men about sex and I drifted first of all into psychotherapy in London which was very expensive and seemed to me absolutely superficial. I got rather desperate.

MB Can I just take you back for dates on that Archie. Can you tell me when that swap to tissue culture research came.

AC Let me think... I would be... I went up to Cambridge at about eighteen that would be 1927....four years, that would be 1931, and 1932 I probably started tissue culture research. I got very neurotic about my defects, and you gather rather a number of neuroses rather than any central defect, and I finally came to the conclusion, that in order to have any hope of a satisfactory future life I must be psychoanalysed. Freud had drifted to mind. I had read quite a lot about him and some of his actual works, and this was a decision I took entirely on my own, without consulting anybody; I abandoned the tissue culture world and went to Berlin and tried to find an analyst. The man I found, Theodor Reik, was one of Freud's early pupils, a very brilliant man, but it was unfortunate we were so different. He believed strongly in intuition while I couldn't help in those early days asking - 'Why? What's the evidence for what you are saying,' and we quarrelled a bit on that and I think that possibly upset what is usually called the transference between the analyst and person analysed. Then further complications occurred. I started in Berlin, but if you notice the dates in 1932 Reik decided to leave Berlin, very sensibly, out of fear for his life, and go to Vienna and I followed him. There I started, with his agreement, to study medicine and I did nearly two years studying medicine in Vienna. I thought the type of medical teaching was absolutely appalling. You were never allowed near a patient and never to touch them except, oddly enough, in the psychiatric place ... and the teaching was purely didactic or authoritarian and there was no scope for argument or anything like that.

MB Did you meet Freud in your period of association with Reik?

AC I went to a seminar run by Freud. He seemed to me rather bad tempered and he didn't approve of any criticism or tolerate any. He just gave his lecture and the believers just had to accept it. I was getting rather disillusioned with psychoanalysis, though I must admit that a number of neuroses that had surrounded me when I went there disappeared and I thoroughly enjoyed those years, but it was obviously having no effect on my central sexual defect. I became rather sceptical, but life in Vienna was charming; the opera, the theatres. I learnt fluent German.

MB Did you speak German before you went there?

AC I knew a little German, but I became very fluent in Vienna. I could easily pass myself off as a Dutchman or even a German, and I enjoyed skiing in the winter, Weinerwald in the summer and went on trips to Budapest, and got on well with students of all nationalities, but above all I became acquainted with German culture in

a very big way, and also politically I got a tremendous education and became a fairly violent anti-fascist. I had seen something of the troubles in Berlin and heard an enormous amount against Hitler while I was in Vienna, and finally Theodor Reik had to leave Vienna before Austria was invaded and he went up to Holland. I followed him again, and by the end of my psychoanalytic period I don't think I'd learnt much medicine.

MB Did you learn medicine while you were in Holland?

AC Yes, I did my surgical stint in Holland at a Catholic hospital where they were very kind to me, and I learnt quite a lot of Dutch and there again there was this authoritarian approach. There was very little discussion of evidence and I became disillusioned with psychoanalysis, because of the lack of evidence, but also with medicine there. They seemed equally bad and I returned to England to complete my medical career.

MB This was about 1935?

AC Round about then, and by lucky chance I chose University College Hospital, who accepted this rather odd character who turned up. I found that having a double first does help in life and they accepted me, really, on that basis. There were some very good people there. I was very lucky and I was taught by Harry Himsforth, Trotter, George Pickering and Tommy Lewis....and then among the students there was a lot of stimulating, odd types, including Hugh Sinclair whom I quarrelled with almost continuously, but I do find him stimulating. And we started a sort of club of individuals who would ask consultants what was the evidence that their treatment was having any effect. We found this great fun. There was so little evidence available. I began to see that in Britain, at any rate, there was some scientific basis for medicine...and it was very much better than teaching in Vienna. But then the rumours of a Spanish Civil War came and I dropped out a second time from research. Looking back I know why I did. I was terrified that Fascism having spread in Germany and Italy would spread to Spain, and that France and Britain would be completely cut off. I disliked Fascism terribly. I'd seen a lot of the results in Berlin and I was finally persuaded to drop out from medicine and a scientific career and go to the Spanish Civil War and I must say was encouraged by George Pickering, later Sir George, and D'Arcy Hart.

MB Can I just take up one point, here, Archie. You had a rich medical education in the sense that you travelled around and you spread your interest enormously. You began at Cambridge, you went on to the Continent, you went from Vienna to Holland and then came back to London. Where did you actually get your medical qualification? Was that at University College Hospital?

AC That was at Cambridge. I went to the Spanish Civil War and didn't learn much medicine there but I became expert in two things. Running triage it is a very skilled job. I studied it carefully, consulting surgeons. You have to pick out people who are going to die anyway and which people you should give priority to go into theatre. I had a tremendous room with all the wounded coming in and I had to make a quick choice as to who was to live and who was to die and I got pretty good at it. It

is a big responsible job and it led to my interest in screening much later. The other thing, I became expert in making aeroplane splints for arms. I used to make about two or three dozen of them before each attack and have them all ready and beautifully adjusted to suit each arm. You remember them?

MB Please tell me about them.

AC They went with the fashion. You used to have a very complex right angles splint structure made up of wire for supporting wounded arms. But for the rest of the time I acted as an administrator and was very useful as a translator. And I got a further political education in Spain. Then a period came when they wanted to send certain people home and one of the priority groups were students who were sent back to complete their careers. I was sent back and went back to University College Hospital. I was a bit worried about whether they would accept me or not as I hadn't had any permission (to go to Spain), so I picked the most right wing consultant I could think of and went on his round and he noticed me. I had a big red beard and was very bronzed and he pointed his finger at me in the course of discussion and said 'Oh Cochrane, nice to see you back. Have you had an interesting weekend?' I knew I was safe. He won, rather. So I returned to University College Hospital, got medically qualified, and Harold Himsworth, later Sir Harold, gave me a job in the medical unit and I started doing research on diabetes. Then the war came and I volunteered, and within about a year I was a prisoner of war. I was captured on Crete while being Medical Officer to D Battalion Layforce, one of the Commando units. I don't want to talk much about Crete, it was just a shambles and I was captured on the shore at Spharkia and flown to Athens with some wounded. I had an awful time there and then a very unpleasant journey up to Salonika. We were told this was a permanent camp and that our conditions would be very much better and we arrived there very tired, hungry and weary and found it was much worse even than Athens. Looking back on my prisoner of war experience there were three bits of it and from each bit I learnt a great deal. In Salonika, because they evacuated all the other officers, I became by curious chance Senior British Officer, Senior Medical Officer, with one medical assistant, looking after something like eight thousand British prisoners, in appalling conditions. It was the caricature of responsibility without par. I could diagnose the illnesses alright but there was no means of treating them and we had awful series of epidemics of diphtheria, which I had been brought up to believe was a lethal disease, typhoid and jaundice and we had sandfly fever throughout all that period. That's a mild self-limiting condition. But fortunately, for some extraordinary reason not due to my clinical skills, we only had one death from diphtheria and one death from typhoid.

MB How did you approach treatment with so little to use?

AC You diagnosed them. The Germans refused to allow me to have a separate hospital for them. I had been taught to give them serum but the Germans sent nothing so I had to watch the infections go through the camp and all we could do (in the case of diphtheria) was to remove the membranes to stop them suffocating. I did a round every day with wooden sticks, removing membranes. It's amazing that only one died. After I'd diagnosed the first case I didn't sleep for nights, assuming there would be mass mortality. When I diagnosed the first typhoid case, I'd never seen one before,

but the pink spots are pretty easy to diagnose. I'd read about them. And again we only had one death. We had some wonderful orderlies. They were mostly Quakers, captured with the field ambulance unit in Greece, and they really gave the patients some amazing care. Two of those orderlies, later became very well known doctors, Bill Miall of the Medical Research Council, and Duncan Catterall, a king of venereal disease, more or less. The diet there was something like seven hundred Calories a day. We also had diarrhoea continuously and we had survived those three epidemics. Well, diphtheria and typhoid we'd survived and simultaneously the outbreak of jaundice. Then I noticed that everybody was beginning to swell. Legs were beginning to swell. Their bodies were entirely emaciated you could see it quite easily on the parades with people in shorts and no shirts....awful appearance of bulbous legs and emaciated bodies, I had it myself, and they had pitting oedema well above the knee. I got very worried and I saw the Germans, and my German was excellent, they understood what I was saying, and I told them they (the prisoners) were suffering from hypoproteinaemic oedema, which even with my clinical ignorance was pretty sound when you're on that sort of diet. The Germans said 'Rubbish' it was all due to exposure to the sun, which made me very angry indeed, and I got more and more desperate as these cases were swelling up. It got worse and worse; you could almost see it on every parade. At the same time life was made almost intolerable by the shooting of people inside the camp from outside the camp, and for some reason they concentrated on the hospital staff. The first one went into the ceiling of the dentist's room and brought down the ceiling while he was extracting a tooth. Not much damage was done and the Germans apologised. The next one went through my hair when I was examining for a spleen. I remember the case; I've never felt the same about spleens ever since. Again they apologised. There was no glass in the windows, so these things happened very easily, and then there was a lull and then an awful day when I found two of my orderlies had been shot outside the hospital and I raised hell. One had to be....I had to get an ambulance and take him....it was a big surgical case, and then they shot another one, and one died and another one lost his arm. The Germans always said it was a mistake so I got rather round the bends. I decided I had to do something and out of the depths of my unconsciousness the phrase 'wet beriberi' occurred and I thought there was just an outside chance that there was wet beriberi in the camp. I knew nothing about wet beriberi except the name. It was fairly easy to get yeast. They were making so little bread in Salonika there was plenty of yeast and I bought some yeast on the black market and arranged a trial. I got twenty volunteers I think it was. I cleared two small wards and just lined the volunteers up. They were all young and had about the same degree of oedema up their legs and I numbered them off: odd numbers to the left, even numbers to the right and explained to them what I wanted to do. It was all based on that great man James Lind who was the only model I had. He was rather a hero of mine. Half of one ward got yeast every day; two small doses. I hadn't much yeast, and for the other ward I managed to find some vitamin C pills. I felt to make it ethical I ought to give them something, and the only output measure I could think of was the number of times they peed per day. I would like to have measured the volume but had no containers. We had orderlies on night and day to control the amount the two groups drank, so it wasn't that badBy modern standards it was a terrible experiment. In three days, and the orderlies and the people themselves kept the number of times they peed, there was a very big difference. I've forgotten what it was. Unfortunately the paper was taken off me in one of my searches in Germany later. But after a fairly

short time there was a big difference. I wrote it all up. I used to ask them to stand up and walk about; from both rooms and tried to measure the extent of their oedema. It is not an easy thing to be accurate about, but about half the people in the group getting yeast seemed to have lost a lot of oedema which was now below their knees. They also, when asked whether they felt better or not, nine out of ten felt better, while in the other room none of them felt any better on the vitamin C. So I wrote all this up and asked to see the Germans. To be fair to them, if I asked they usually saw me, though they usually kicked me out. And this time I gave them a little scientific lecture and was as academic as I could be and warned them that there was evidence of an absolute disaster and a very high death rate in this camp which would be known about, as it was bound to be written up after the war. And I asked for three things. I asked for the cessation of shooting, a large supply of yeast, and a rapid evacuation of the camp into Germany where I understood the diets were very much better. They said they'd think about it. I went away. I remember that night, I just went to bed and cried and cried. I just didn't believe the Germans would do it at all. I really thought there was going to be a major disaster in the camp and that I was, as Senior Medical Officer responsible, and after a terrible night I got up to do my normal sick parades and to my great surprise there was heaps of yeast and the shooting stopped, and within a month they had started the evacuation of the camp. It was extraordinary the difference it made. We gave everybody yeast. Some bad cases got two spoonfuls a day and the others got one spoonful and the world just changed. I must say it must be one of the rare cases where the doctor in charge of the trial benefited from the trial himself. I slowly got better, the whole camp got better, the shooting stopped and life became better. I remember, I think it was within three weeks of the beginning of the massive change, I sat out in the sunshine playing bridge, a thing I couldn't conceivably have done a short time before.

MB That must have been the best miracle you could have hoped for.

AC But I've no idea and I don't think anyone's ever explained why it worked. It certainly worked. One suggestion is that it's the small amount of protein in yeast that might have had the effect, but the amount is very small.

MB It might have just tilted the balance.

AC Anyway it worked and they slowly evacuated the camp, and then a Senior Australian Officer came up from Athens with the remains of his hospital and took over from me. I was very glad to hand over.

MB That was a wretched time.

AC It was the worst time in my life, I think.

AC I then moved into Germany where I was in three different hospitals. The first two hospitals were rather similar and I learnt the same thing really from them. The first was fascinating in a way. It was a very big mental hospital and consisted of a whole lot of different houses in a big estate, and the story was (that) they'd bumped off the inhabitants of two or three houses and handed them over. I think that's a wicked story, but they handed them over for prisoners of war and surrounded them

with wire. So the prisoners of war were in the unusual position of being behind wire with schizophrenics gesticulating at them from outside the wire, which gave one quite a different position: And, after Salonika, I settled down there quite quietly. I took over all the TB patients because I knew something about tuberculosis and I also took over all the Slavonic patients and learnt Yugoslav. There is a nice story about the Yugoslavians. They were all peasants, so didn't know any German or French. I knew German and French but didn't know any Yugoslav but tried to learn....and later on a young Yugoslav Officer came and I checked over my vocabulary, and to my horror I found that the word "boli" which I had been using and thought meant pain also means better. So I was muddling the works for **better** and **pain** and trying to be a doctor, but nobody died. I enjoyed that period in the first hospital. One other experience I just must mention. It was so odd. It was on Christmas Eve. I can't remember which year and the German sergeant in charge approached me rather nervously saying would I help him medically. He pointed out that it was purely a medical thing I was asked to do, not a political thing in any way, and offered me quite a lot of alcohol and permission to use the radio to listen to the English news. I thought this a reasonable bargain. It had to be that night. He took me out to a stable on Christmas Eve. There was a cow in the stables and a pregnant woman and he asked me to look after the birth. I think it was an illegitimate child of his. It was perfectly normal birth. I hardly needed to do anything. I tied the umbilical cord and then was taken back to the camp. I wasn't allowed to see the child again. I often wonder what happened to that child. It's quite unnerving on a Christmas Eve to do that sort of thing. Then I had a short period at the Offlag. That's one of the officer places but I don't quite know why I was sent there. I was only there a short time. I didn't enjoy it. Regular Officers in captivity got terribly neurotic and there was a lot interesting educational work going on. You could play bridge into eternity and things like that. It wasn't my line of country and I went off to a much more interesting place, Elsterhorst. This was a very large camp surrounded by wire where all prisoners of all nationalities with tuberculosis were sent. It really had a very international staff: Polish, Australian, New Zealand, British and French, and we had prisoners of all nationalities. There I settled down for quite a long time. I learnt two things there. The first was the pretty obvious one, the vast importance of care. It becomes far more important in a prisoner of war set up, when you have to supply everything. You have to substitute for their families and you have to try and keep them continuously occupied and we did make tremendous efforts in that direction. But the other thing which was more important, I think, to me was that in those days there were four treatments of tuberculosis: you could either keep them in bed and feed them; you could do pneumothorax - collapsing the lung; or you could do a double pneumothorax if you were really worried; then you could do a pneumoperitoneum - blowing up the peritoneum in order to raise the diaphragm and produce partial collapse of the lungs; or you could hand the case over to the Australian surgeon for thorocoplasty. He wasn't a very good surgeon and so I was never very keen on that. I don't think I handed over any of my patients. But I began to notice that I was occasionally doing harm, particularly with pneumothorax. I produced some empyemas which in those days were almost certainly fatal. I got very worried about this that there was no way of knowing which cases to do pneumothorax on or what the risk of complication was and I became rather neurotic about intervening in these cases and longed for some evidence of when to do a pneumothorax, or when to do a thorocoplasty. There was really no evidence in those days. So I decided I would give

up clinical medicine then, and go in for preventive medicine. I just couldn't stand this idea of not knowing whether I was doing more harm than good.

MB This was the major change.

AC Yes. And then I had a fearful row with the Germans and very reasonably, I think too. Cases were being taken away to be repatriated, very ill cases, and two of mine. One with a bilateral pneumothorax and the other a pneumothorax. I found them trying to put them onto an open lorry in a driving snow storm and I lost my temper completely and jumped on the lorry and made an inflamed speech in German, ending with the words, "Das ist doch ein skandal im lande von Robert Koch" [this is a scandal in the land of Robert Koch]. The Germans were furious, but they did give me an ambulance and I was packed off immediately afterwards to what was called a prison area at Wittenburg am Elbe and there I learnt another thing. It was a terrible place and I was the only doctor and I had a wretched little (hospital). I think it was a brothel before being turned into a prisoner of war hospital... and with very limited washing facilities and limited cooking facilities, and a fantastic international staff. There were Russians, Poles, one British, two French and one Italian. And we had to look after what was called a *straff area*, an area where there were a lot of workers of different nationalities who had caused trouble and been put into this area, where there were several different nationalities. And every morning I had a sick parade from about seven, often till midday, and it was very difficult to get people off work. The sergeant watched me very carefully. I did work very hard on that. We increased the percentage off work enormously, I trained people how to mimic certain diseases that I thought were safe. Backache and migraine, I found very good value. They were never spotted as long as we didn't overdo it. Later I arranged a little epidemic, but on the whole I got rather fond of these wretched miserable people. I was the only allied officer in the whole area and they looked to me for help and I did what I could for them. But I had a curious opportunity there, I found that the whole area had been x-rayed by the Germans who, to their great credit, used their mass radiography on the prisoners. Chiefly they were frightened of disease spreading. I knew the date (this x-raying had been done) and then I was able to get all the new cases in the various nationalities from a certain period onwards. I made friends with a local clinic which would screen cases for me and I picked up a lot. I related the number of new cases of tuberculosis since the screening to the amount of food they had. There were just three groups of people, the Russians and the Poles and the East European who had no parcels, the French who had some parcels until late 1943, then it stopped and the British who had parcels right up to 1945....and the incidence of TB is exactly the reverse....and that gave me my first interest in epidemiological measurement. So I ended four years, probably a more educated and more sophisticated person than I was, though it was a very unpleasant experience. I returned to England, still in the army, and whilst in the Army I tried for a Rockefeller Fellowship, based on my double first and prisoner of war experience, and to my surprise I got it and studied the epidemiology of tuberculosis in the United States and also came upon this other thing that has interested me for the rest of my life, medical error, first in interpreting chest x-rays and then the error in prediction. My first paper published in America was about the error in the prediction of x-rays. I showed that the radiologist concerned was slightly better than a random selection, but not significantly so.

MB Archie, before we go on to that part of your career, can I just go back to the German days. One thing which you might not have talked about, but which interests me enormously.... Whilst you were in prison I think you wrote in a way you had not written before or in a way in which you have not written since. You wrote some poetry. You produced a book of poetry which is fascinating.

AC I didn't think that was particularly relevant from a medical point of view although it had a vague medical association. I did write a little verse as a child but I hadn't done it for ages....but in moments of extreme depression I found this was the only solution and I was occasionally put in solitary confinement for things I said in excellent German....and if you're there and you've got nothing to read and no one to talk to and insufficient food to keep your mind off other things.... I found the only thing to do was to compose verse. Though difficult it passed the time admirably. Also, if you wrote a verse about how you were feeling, it had a tremendous therapeutic effect on me anyway. I never thought they were dignified in terms of poetry but they had a very marked medical effect for me. I've shown them to a rather limited number of people. Some like a few of them but poetry ought to be easily conveyed to other people and I don't think it is in this case.

Part Two

MB Archie, I wonder whether you would give me some more insight into that start of the epidemiological work in Wales, it was so important. Could you take me through that start?

AC I came back to England wanting to study the epidemiology of tuberculosis and I hoped to work for D'Arcy Hart but he didn't have any vacancies at that time. Then I had a scheme of working in Scotland, but that fell through. There was a quarrel between the Scottish MRC and the English MRC and at the same time I got an invitation to work with a pneumoconiosis research unit who were wanting an epidemiologist very badly down in Cardiff. I had visited the unit before I went to the States when I did a sort of tour of what was going on in Britain and unfortunately met the wrong people and I had rather a poor opinion of it. But finally went down at Charles Fletcher's (the Director's) request and met the ideal people for me to work with; Charles and John Gilson and Peter Oldham and so forth. They all fitted in with my interest and we could communicate easily. I needed statistical help which Peter Oldham would supply and we could discuss things in a perfectly easy way. So I finally....I didn't want to go to Wales, I must admit....I sold my lovely flat in London and packed up everything and came down here, bought Rhoose Farm House (subsequently) and have stayed here ever since. Now I was, I think it was about ten or twelve years, perhaps fourteen years, at the Pneumoconiosis Research Unit. I enjoyed it enormously and it was probably the happiest period in my life. Everything seemed to fit in well. There was a very important immediate question. We had to do something. Pneumoconiosis in those days was very important politically, and I began to see roughly how to tackle it and I put forward this thing called the Two Valleys Scheme, which was well received and did prove of great use. I don't want to go into details of it, but it was testing the main hypotheses about the aetiology of PMF (progressive massive fibrosis) and also arranged so it would have enormous side

effects that would be very useful. And it is still of use, in the Rhondda Valley. I've just finished using it by studying a thirty year follow - up of the men living there.

MB Archie, can you give me more insight into that start of your epidemiological work in Wales. It was so important, could you take me through that start?

AC Well, when I arrived at the Unit I had some routine things that had already been arranged. This was mostly x-raying all the miners at particular pits. I learnt one thing from that, or two things. First of all, unless you got over 90% (response rate) your measurements of prevalence (of disease) would be influenced. We found that if you took the first 20% to be x-rayed the next 20%, all coming up more or less voluntarily, the prevalence of tuberculosis rose and the prevalence of pneumoconiosis fell. Presumably, people were frightened of tuberculosis and didn't want to be x-rayed and people came forward to be x-rayed for pneumoconiosis in order to get a pension, which seemed quite reasonable. So that was the first. The second, was that it was no good just x-raying people working at a pit. You must x-ray all the ex-miners from that pit to get an estimate. Those were the first two things I learnt. And then Charles (Fletcher) asked me to put forward a big epidemiological scheme and to do that I obviously wanted to test the main hypotheses about the aetiology of progressive massive fibrosis which was very much the most serious form of coal miners' pneumoconiosis. At that time, chiefly influenced by Professor Gogh in Cardiff, the main hypothesis was due to a mixture of tuberculosis and dust. This hypothesis I thought could be investigated by taking two comparable mining valleys. In one valley I would x-ray everybody, man, woman and child over the age of five and get all the people with a positive sputum for tuberculosis put into hospital, thus reducing the amount of tuberculosis floating about, and called exogenous tuberculosis infection. In the other valley I would only x-ray the working miners. Then we could measure after a time, the rate of appearance of progressive massive fibrosis of simple pneumoconiosis background in the two valleys and the amount of exogenous tuberculosis should be very different in the two valleys and it was a rough test. We would then have a completely defined community, defined by census and geography and we could use that for studying the death rates and the various factors influencing the appearance and progression of simple pneumoconiosis. And Charles liked the idea and sold it, very rapidly, he was enormously skilful about this, selling it to the Medical Research Council, selling it to the various health authorities in Wales, and we got started on it very quickly. But to do it I had to build up a small team and I was incredibly lucky in the people I chose for that. There was one really tough communist miner, who had the biggest shadow of progressive massive fibrosis in his lungs that I ever saw but for some reason went on working for me in a most superb way. Then we had another ex-miner who had had very severe tuberculosis and been healed by a miracle, then another man from the Rhondda who was a friend of Gwillan, that was the TB man, and a very good radiographer who organised the actual taking of the x-rays, and we set out slowly. And we added a few people occasionally. I had to have a good secretary, and we set off and learnt the techniques. The first big obstacle was that we had to get about 90% of the people over the age of five in the Rhondda x-rayed and this was an amazing task because no one had ever done it before and I was rather doubtful myself and I know a lot of my friends took on bets about it. Some said they thought it would have to be 50%, or that I wouldn't get 50%... and so on. And we had a very bad winter. It snowed like anything and we struggled on, yet

ended up with 89.9%. So I was very pleased with myself. Then in the next valley to the one we chose, was the little Rhondda, about forty miles from Cardiff, and then separate ... but quite close, was the control valley (Aberdare) where we only x-rayed working miners. That was easy. We then, after three years, went back and did the whole thing over again. This enabled us to ... measure the attack rate of tuberculosis by age and sex and the attack rate of progressive massive fibrosis. There was a slight difference in the two valleys, but it wasn't significant and we decided to do it again in eight years and in eight years there was absolutely no difference. So we could give no support to the main hypothesis ...and all the work after that has confirmed this, that tuberculosis is not important in the aetiology of progressive massive fibrosis. But even more important was the possession of this valley, the Rhondda Fach, where everyone had been x-rayed and we could take random samples of it (the population) and we could follow it up and get the association between x-ray category and expectation of life. The spin-offs were really as important as testing the main hypotheses and enabled me to go ahead with my basic idea was to make it possible, technically, to make measurements in communities with the same known inaccuracy as people did in laboratories. And though we started with pneumoconiosis and tuberculosis we rapidly spread out: rheumatoid arthritis, anaemia and ophthalmology came in and so forth. Blood pressure particularly was important. It was the only community where you could offer random samples to other workers and they just came down and I could, with my team, assure them that we could get 90% of them to be examined. I was very cautious at first. I didn't really want to take blood off them to begin with, I was so frightened to upset them but we became more and more ambitious and in the end we were taking ECGs and everything. I kept them waiting an hour and a half and we still got 90%. So it was a very useful beginning and to some extent it put accurate epidemiology on the map. People were convinced. If you can get an over 90% response of a well defined community, people will accept your result as accurate and scientific. So we spread out in various directions, studying more diseases in addition to pneumoconiosis and tuberculosis and then we moved into other communities. We studied random samples of men aged 55-64 in Lancashire and Derbyshire, at Stavely, and also a community in the West of Scotland. My team were really amazing. I loved home visiting. I also did all the chest x-ray reading and was always available to people to talk about their x-rays. That was a very difficult subject because money was involved through pensions. I couldn't ever give a written thing, so I struck a bargain with the Ministry, that I would just give them my opinion as to what the betting was whether they would get (a pension). All miners understand betting odds and used to say 'Well, you know, I think it's 2-1 against you, but if you happen to meet the lady (on the assessors panel) it's about evens', and that sort of thing, and they loved it. I was pretty accurate of course because we were all using the same classification. Then I used to hear whether my betting had been accurate or not. Occasionally there were troubles. I did tape record what I said to one miner who complaining bitterly and he was a liar...he told the Ministry something that I had never said.

MB So you were in a difficult position:

AC Yes, but it worked out very well. They were quite fond of me.

MB Yes, you built up a terrific rapport with the two valleys.

AC One of the main town in the valley was Mardy, which used to be called Little Moscow, and the fact that I had been in the Spanish Civil War was quite a help I think. I thoroughly enjoyed it and still do. We started doing follow - up studies at three years, eight years and we were able to relate the x-ray category to percentage dying. I have, just now, completed a thirty year follow up of those 8,400 men over the ages of twenty-one and each follow-up has produced results. The only trouble was waiting for an experimental technique....You remember in Salonika I had done a little experiment there.... I wanted something to be invented like that, and that's why I was so delighted when the randomised controlled trial was introduced into British medicine by Sir Austin Bradford Hill, who'd actually taught me when I got my DPH before going to America. I was absolutely fascinated by this ... and we applied it to some extent to pneumoconiosis. The trouble is that you can't for instance randomise miners, some of whom will leave the mine, some who'll stay in the mine, who have the same type of x-ray. That would have answered the question as to whether continuous exposure to dust really affected it. That was ethically and practically impossible. We did look into the effect of anti-tuberculosis therapy on the progression of massive fibrosis and then, later on, I used the randomised controlled trial pretty frequently....but there was a shadow over all the period of the work of the Pneumoconiosis Research Unit. We knew that the Medical Research Council were determined to hand over all the research on pneumoconiosis to the National Coal Board and I would have to give up and do something else, which isn't easy, because I was getting on in years by then. I was rather tactless with the man it was handed over to. I knew him, I won't mention his name, and I didn't think he was competent to do the job. I wanted to do the job myself, in a way, although I didn't want to work for the Coal Board. I wanted to stay with the Medical Research Council. In the end I decided to put in for a professorship of chest diseases in Cardiff and develop new interests. But I enjoyed my time at the Pneumoconiosis Research Unit and I am very grateful to my colleagues there who helped me enormously, and to my little team. They stayed with me when I became a professor, because I was made Honorary Director of an Epidemiological Unit, and managed to produce some new ideas. You see I'd been there for more than ten years knocking on practically every door in the Rhondda. I knew people. No one can resist talking about their diseases if a doctor comes and knocks on the door and I wasted an awful lot of time, but I got wonderful, no not a wonderful, a rather depressing picture of the working of the National Health Service. I knew nearly everything that had gone on there and I gained an interest that I had as a student: what was the evidence for what was being done in the National Health Service and I got very keen to try and improve things. I saw that through the means of using the randomised controlled trial an awful lot could be done. I also had this brilliant team. I had to keep up employment for them. So I looked around for a sort of *entrée* into this new world of what you might call effectiveness and efficiency and fortunately the problem of screening came up. It was very popular in this country and I was once accused of heresy when I criticised it. But it was quite obvious that the idea that if you find all the early cases of a disease in a community, it's no good unless the improvement in treatment, by diagnosing the thing earlier, is of any effect....and in many cases we were pretty sure it hadn't any effect, particularly in cancer. And I proposed that we should use the randomised controlled trial to see whether it had any effect. You can do that in two ways. You can either screen one community and not another and it's very difficult to get two communities exactly

comparable, but that has been done. The other way is to screen the thing and then only treat half the early cases you find, which is considered fairly ethical so long as there's no evidence that the treatment is effective. We used this technique for anaemia and glaucoma (screening) and something else, and showed convincingly that it really wasn't working. And I wrote and lectured about screening a great deal at that time and got into awful trouble.

MC I think you had a challenge for people who wrote to you to supply evidence to the contrary.

AC Oh yes, that was standard. But there were other things I got interested in. I found it a very interesting period in my life because I was a professor and teaching 'chest diseases' and at the same time I had this research unit working very nicely.

MB Was that accommodated in the same place?

AC No that was the trouble. On the whole I think it would have been better if I'd never become a professor really. I could have devoted more time to my unit. At times I really couldn't do enough. But I wrote down some things I meant to do, to show that they could be done. I wanted to persuade some clinician with my help, to randomise a place of treatment. There were three places of treatment, home, out-patients and in-patients, and you've got to compare all three. So there were three different things I had to do there...and then I wanted to randomise length of stay, always getting people's opinion afterwards as to whether they preferred a longer stay or a shorter stay, and we slowly did those. It took a long time. One went very smoothly. We had varicose veins treated at out-patients and in-patients. I had a very helpful surgeon and my unit worked with him very closely and that went very smoothly. The economists were brought in for the first time and they were able to cost the thing, and they loved it and wrote it up in a big way. They thought this was the beginning of a more sensible health service. For my next one we tried randomising males with acute coronary disease between home treatment and coronary case units, and this produced a storm. I got almost tired of it. Gordon Mather in Bristol wanted to do it as well. He's a very good clinician and we got together and chatted about it and we both decided that our local ethical committees would turn us down. The Medical Research Council and other people never do anything without taking their project to an ethical committee but I discovered that the Medical Research Council headquarters and the Department of Health wanted it done. I was well known to both of them at the time. They set up a committee in London, headed by a medical knight and Sir Harold Himsworth was on it and I think the head of (the medical officers) at the Department of Health and Social Security attended as assessors, and they wrote round to all the consultants in heart disease saying would they attend the meeting and bring any evidence they had showing that coronary care had a good effect. Gordon Mather and I were asked to debunk their evidence if they had any and we were told that unless we could debunk their evidence pretty thoroughly we wouldn't be allowed to do the experiment. We had two days of this; great fun. I knew all the evidence; I knew I could debunk it and we did. I'm much better on arguing about evidence than Gordon is and we had a field day, and the Chairman said 'well there's no evidence that coronary care has any good effect. It must be ethical to do the experiment'. I was terribly pleased, so I went back to Cardiff full of the joys

of spring, but the next day when I met the cardiologists in Cardiff they said they didn't care a damn, what they said in London, they were certainly not going to do the experiment in Cardiff, which made me very angry indeed. I did my best but there was nothing I could do about it. So I helped Gordon Mather do the experiment in Bristol where he didn't have any trouble. And it was very useful thing. The evidence did suggest very strongly that coronary care units at that time were not doing any good, but the Royal College of Physicians, I regret to say, took rather a poor view of it and we didn't really have very much effect. I enjoyed that period very much doing what was called applied research, and I got enormous help for it from my old friend Dick Cohen, a contemporary of mine at Kings who was then a doctor at the Department of Health. He gave me great backing. Then various things happened. I was asked by the Nuffield (Hospitals) Trust to write a book about the health service and I wrote this book *Effectiveness and Efficiency* which had a remarkable success. I was very surprised by it. My colleagues at the Pneumoconiosis Research Unit complained bitterly. How dare I write any thing so completely obvious while other people thought I was going to extremes in criticising the Health Service. It is mostly an advertising thing for randomised controlled trials and I think it was very useful, and sold very well in America. As a result I lectured a great deal in America and there's a nice story of when I was introduced to somebody. They said 'Oh, you're Archie Cochrane are you. Oh yes, I bought a dozen of your books for Christmas cards this year'.

MB What do you think about that book. That was an important step despite what former colleagues at the Pneumoconiosis Unit felt.

AC Well I think it had a certain effect and I'm told by communists rather surprisingly, that no one had ever used the words effectiveness and efficiency in relation to the Health Service until my book came out and now it occurs in *The Times* practically every day. I don't like the way efficiency is interpreted. I agree that cost comes into efficiency, but the word is being used entirely in terms of costs. You must take in other elements: whether the patients or other people like it, and there are a lot of other end points that must be taken into consideration when investigating efficiency. I think effectiveness is still alright and the use of randomised clinical trials has increased. The only tragedy is that it hasn't spread through out the world. Very few are done in France and Germany and none in Russia and it's really confined to Canada, the United States, Scandinavia and United Kingdom. If all the countries would join in we could get the answers far more rapidly. The attitude of the Germans is quite extraordinary. I was over there only about three years ago and my German was still very good and I gave a standard lecture on the use of the randomised controlled trial in organising the treatment for heart disease. A very straight forward think: the randomised controlled trials of place of treatment, length of stay, and all that sort of thing, and I've never had a more riotous reception. My God they were rude to me, in German. Fortunately I can fight back in German and we had a real battle. They considered me utterly unethical and I complained that they were unethical: they weren't checking that they were giving their patients the best treatment. And it went on for nearly three quarters of an hour. I got pretty tired. The real story comes at the end. The professor, took me out and give me dinner and on the way out in excellent English he said 'You know, Dr Cochrane, you don't seem to understand about controlled trials. Controlled trials are done by the pharmaceutical

industry. Gentlemen don't do them'. An extraordinary statement. I had great difficulty in not laughing. But I must hurry on. I certainly had great pleasure from the pneumoconiosis research and the pleasure of doing applied research in my new unit, and then a new thing came into my life which I didn't really want. I was on a committee associated with the setting up of the Faculty of Community Medicine and I wasn't terribly interested, I must say, to begin with, but I happened to be on the committee when it had reached a very critical stage and we were discussing who should be the first President and I suggested Sir Richard Doll and as far as I remember....but I think he denies it. I went up and persuaded him to take it on. He did promise to take it on and I went off for my usual skiing holiday at Davos feeling everything had been settled, and when I came back I discovered I was under enormous pressure to become President myself. Richard had withdrawn because he had a much more important job to do for the Medical Research Council. But for me it meant, really, giving up research. Being President of anything is pretty hard work but to set up a new Faculty was almost full-time, and for the next three years I really rather neglected my research unit. I resigned as a professor to make things better but I really was... I lectured everywhere in one year from Orkney to Portsmouth, so I did my bit and I did get the thing set up and then resigned after three years. I'd had quite enough.

MB Are you happy with the way in which that Faculty has progressed?

AC I knew there were going to be difficulties. This balance between epidemiology and administration was never straightened out. I discussed it endlessly of course and the Department of Health and Social Security said in those days there were going to be so many administrators that the doctor would be free to do research but it hasn't worked out that way at all. They are far too many administrators and not enough to do with research work. I think it's essential that you have something like that to improve the efficiency and effectiveness of the health service, but I doubt whether we've struck the right mixture yet.

MB Archie can I just take you back over the story. There are three major components in it. First of all you had your interesting 'qualifying' period travelling the world and qualifying in medicine as well as going to Spain and fighting against the Fascists there and then coming back and going on another venture you didn't expect around prisons in Greece and Germany....that was the second phase and a very moving and desperate one at times. And then you came to Wales and became concentrated on epidemiological research. In that time you've made enormous strides forward, in your own view of medicine and where it should be going, you've also helped other people to form views. What, looking back over those years have been the great moments and secondly what do you think has been lost that you would have liked to have seen ... won?

AC I think the three big happenings during my life have been the appearance of antibiotics, and the appearance of randomised controlled trials interestingly enough, introduced by non-medical people. I think it's right also that while Sir Austin Bradford Hill introduced it, Richard Peto has made it very much more useful. I think those three are the people I would consider that have really influenced medicine in my lifetime: Florey, Bradford Hill and Richard Peto. I don't know whether others would

agree with me, and there have been enormous advances. Recently, as you know, I have been frequently ill and I've visited a lot of National Health Service hospitals and I'm amazed how they've improved over the years. They're kind, they're efficient, and they really care for you. I was very impressed with them. The food is wonderful.

MB What has been lost that you think is the next step forward?

AC I don't think very much has been lost. The personal relationships between the patient and the doctors seem to me as good as ever. Personally, I've never been a great opponent of private medicine. If you go to the Soviet Union and Poland you realise it's impossible to stop private medicine. There's more private medicine in Poland than there is in Britain, far more. So that hasn't disturbed me, the growth of private practice. I think on the whole the slow growth of the randomised controlled trial techniques in the rest of the world depresses me....and the use of antibiotics in developing countries has not been a success. I am mostly interested in the use of antibiotics against tuberculosis which has been a wonderful success in Britain and many other countries, but in India and Africa it has had very little effect at all and I find that very depressing. Sorry, I haven't answered your question very well, but I think the rate of improvement in this country has been terrific and I am very satisfied to have played a small part in it.

MB Professor Cochrane thank you.