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My dear Sir Ken

I wish, in turn, to express my thanks & appreciation of your kind and appreciative letter. It has set me thinking, or at least one of your expressions has - You mention a possibility of writing a book or essay on your reminiscences - I hope you will. For my own part, during my 83 years of life - probably the most interesting 83 years in the history of the world, I have had a very good innings, and accumulated a few recollections which may prove interesting to you. I think the first really startling event was one which Bragg & I shared in common. You may remember I told you how I used to drop in at his private room at the ~~Observatory~~ University for a yarn - Well on one of these occasions I found him in a state of great excitement, holding a recent copy of Nature in his hands. He greeted me with unusual warmth & said "Oh Coake just look here - they have succeeded in passing one atom through another". I forget who "they were, but he considered that the fact was undoubted, and his belief infected me. But it was impossible! Each of us held firmly to the Newtonian atom, which was definitely impenetrable. I say nothing about myself, but that was the moment of Bragg's awakening. I can also remember so well how he bewailed the fact that his fingers had not been educated at school. He did so want to start researching on his own. And I can remember how he determined

to remedy the defect & immediately arranged to take a complete course with Rogers, the very capable instrument maker at the University. In later years I could trace that early beginning in his world-famous work on crystals, and on X ray/s/pec photography.

And talking about X rays. In the early part of 1896 I went to Western Australia, and one of my first jobs was to visit England & Europe in connection with the new instruments for the new Observatory. On the actual day of sailing I came across the news of the discovery of rays that would penetrate metal, and the human body, with a description of some skiagraphs that had been actually made - mainly of hands. After the little work that Bragg had commenced to do in Adelaide, & which I was privileged to see, I did not completely swallow the news about the new X rays, but, doubting greatly, I partly digested them on board, & talked about them with other passengers, and for fancy dress at the usual ball that was then customary, I actually painted a set of ribs on some linen & got my wife to fashion the linen into a vest, and went as "X rays". Arrived in London, one of my first visits was to a famous instrument maker in the Strand (was it Stanley's, Elliot's, ?) and was one of the very first to see the results from their latest & largest apparatus, which they had just completed for Lord Salisbury, the British P.M.

I was so fascinated with this new development that I immediately purchased a tube, had it packed, & sent to Mr Hancock, of the Public Work's dept. in Perth, who had charge of all the electrical work for the new Observatory, &

for him to intern it inside the hollow granite foundation stone. It is probably the oldest such piece of apparatus now in Australia, & will certainly be in a few centuries. At the same time I sent Hancock a couple of tubes for himself & he immediately started honorary work at the Perth Public Hospital. Unfortunately he knew nothing about the dreadful danger of ~~#~~ exposure to these rays. Later ~~on~~ he broke out into a most dreadful dermatitis and in a few years died a lingering and most fearful death. He was one of my greatest friends & one of the finest fellows I have ever known, & I have never yet, & never will, get over my great regret at the way we both rushed in where angels fear to tread.

I was also privileged to see some of the early work of another young man who afterwards became a famous scientist - Sir Frederick Soddy. When I first went to W. Australia, in 1896, the Adelaide University authorities, with whom I was then persona grata, asked me to try to get together a small committee of leading educationalists in Perth, and inaugurate a system of Public Examinations, to be identical with, & conducted by, the Adelaide U.E. Board. In this I was very successful. Sir John (afterwards Lord) Forrest, entered heartily into the scheme, became our patron, & allocated a sum of money in the Public Service Estimates for expenses. Sir Winthrop Hackett was our chairman, & the Inspector General of Schools, Cyril Jackson, one of our members. One of our sideshows was to invite a young & promising lecturer from one of the English Universities to pay us a visit & give a series of

popular lectures. These met with instant success. It gave the lecturer a break in his work, an unusual holiday, & a nice little fee. Amongst these young chaps was Soddy, not much more than a boy, and a shy one at that. My wife & I took a great fancy to him & he almost lived at the Observ[y]. His subject at that time was high tension electricity & he brought an enormous coil & gave us some real thunder & lightning. He caught me in a nice trap once. I was his chairman, & the audience included the Governor & his Lady, & all the elite of Perth. After some startling experiments he informed us that whereas 3000 volts were fatal, a million volts could be passed through the human body with impunity "I will demonstrate that" he said "There is now over a million volts waiting to rush round through any circuit that is established between these two poles. The Chairman & I will join hands and each make a grab at one of these terminals, and we shall not be even the least bit distressed". Well I was nicely caught, & although I knew he must be right, I can tell you it was not the happiest moment of my life. Matters were not improved when he whispered "It is quite alright, but when I say 'Grip', grip firmly & don't fumble". Well I am still alive.

I have mentioned Soddy, because he was then just at the threshold of his career, & he gave me my first introduction to radium & radio-activity. I am not quite sure how he developed later, but I don't think it was along these early lines altogether. I frequently come across his name in recent literature, & he has been Knighted for his work, so I know he has developed, anyhow.

One of his experiments was very simple & very beautiful & I frequently hear references to it from those who were privileged to see it. We gave him a send off at the Perth Observatory, which took the form of a euchre party. Bridge had not then come along. Soddy had never played euchre; so my [illegible] (D— this pen) little daughter practically played his hand for him, & he was delighted to get first prize. All this is by the way. When the cards were finished we were practically all grouped round him, just conversing desultorially, when he told us that he had a vile of radium with him & suggested a few experiments. The one that took our special attention when was when he invited any of the ladies who were wearing pearls which they believed to be genuine to expose them to a test. Lady Watterston, who was wearing a magnificent necklace, responded. The test was quite simple, but I really forget which way it went. I think that radium irradiates genuine pearls and has no effect on any substitutes. Anyhow I know that the lights were turned off and the pearls placed on one of the card tables, and Soddy held his radium under the table. I shall never forget the brilliance of those gems in the dark room. It was a beautiful little experiment.

Coming back to Bragg, I should like to refer to his first practical experiment with "long-distance" radiography. I had been in W.A. for a year or two, so it must have been very close to the beginning of the present century. I came over to Adelaide for a holiday, & naturally made my way up to my former haunts at the Observatory. The exact

moment chosen for my visit happened to form one of those remarkable coincidences that makes one wonder if there is something at the back of them, pulling the strings. This particular incident had far reaching repercussions.

When I reached the Observatory I found Sir Charles Todd & Bragg messing about with a Morse recorder on a little deal table on the lawn in front of the office. There was a battery under the table & a wire sketching up to the top of the anemometer tower. Both Todd & Bragg were pleasurably excited & both gave me a most hearty welcome. "What's up?" I naturally asked. "Oh we are trying to raise Henly Beach" That did not sound much sense, but I soon ascertained that this was their first experiment outside the confines of a room to converse telegraphically over several miles without any obvious means of communication. However Bragg showed me a little glass tube filled with metallic filings & told me it was a Coherer, & was the real Deus ex machina. He began to explain, when Sir Charles yelled out "Here he is". It seems that Mr Unbehaun, chief instrument maker at the GPO, was down at Henley with a similar apparatus, & Sir Sir Charles was calling him HB HB HB O &c. All of a sudden a reply came O O O HB. "Got him", said Sir Charles & then came the first "long distance" message ever sent in S.A., and probably in Australia.

I can easily imagine what a kick off that was to Bragg, but I think it was the last occasion on which I saw him. However, it had a "long distance" effect on me. When I returned to Perth I naturally told the family about my remarkable experience, and this had a marked effect

upon my second son Basil - I suppose about 15 years old. From that moment the kitchen department began to lose cups, saucers, plates etc, and the workshop began to miss coils of wire & other things, and in a few days Basil informed us that he had established wireless communication between the anemometer tower and the Dome building.

He & his friend, Ken Glyde, became observed. A short time afterwards the American fleet put in an appearance at Fremantle & Basil immediately paid a visit to their "Sparks" & found them using a crystal set. Getting the hang of that he chummed up with the Director of the Museum, who had a marvellous collection of Australian crystals. Inspiring the Director with his enthusiasm, he obtained permission to test every kind of crystal for its wireless potentialities, & soon had a choice collection of his own. Then these two boys took a wider range - first from Perth Observatory to Fremantle, & afterwards to Albany.

They succeeded quite well at Albany, & one of Basil's last achievements in Perth was to pick up a quarrel between two ships in the Pacific, which was summarily checked by orders from a man-of-war in the neighborhood.

Then I was transferred to Sydney, and Basil, still mad on his wireless, found a magnificent site for his further investigations. It was the old magnetic hut, from which all instruments had been transferred to Pennant Hills. It was quite isolated & empty, & free from all ferrous metals. Besides there was the anemometer tower in the close neighborhood.

Basil soon chummed up with the lads on the Pacific boats & got a little further ahead with the magnetic transmitter. Eventually one of these boys came along with the present valve, which had just been put on the market in America. After a few trials he found he had got the whole world at his finger tips. The other "fans" began swarming round & Basil's two valves became the greatest wonder of the age to them. Then he made his first commercial venture by ordering a dozen valves through his friend. Before they arrived, however, the first world war had broken out, & Lieut. Creswell, the head of radio in the navy, forbade all experimental work, as you will remember; and collared Basil's dozen valves at cost price.

By this time Basil & Ernest Fiske (afterwards Knighted) had become leaders amongst the amateurs, and Basil obtained permission to carry on, under a constant military guard, which was established at the Observatory. He co-operated with the official experts, essentially in directional work, & they succeeded in discovering 3 spy sets, of very superior German workmanship

Basil still carried on, with his new valve hook up & used to listen in to the Germans talking in English to America during the early stages of the ~~war~~ war. A bit later I came into the game. Basil told me he had on several occasions picked up definite clock records on a very long wave — 25 000 metres or thereabouts, and we eventually discovered that the Americans, who by that time had become our allies, had erected the world's most powerful radio tower at Lyons; and amongst other things had commenced a

series of regular "Vernier" clock ticks, I suppose for the benefit of the joint navies. However we found we could prick them up, and for the first time long distance time signals were established as part of the Observatory work.

Rather a curious development occurred in connection with the inrush of amateurs after the cessation of the war. They became quite a nuisance & eventually their sphere of operations had to be restricted. But a remarkable mistake occurred. The experts had been developing along lines which made it seem advisable to increase the wave-length for great distances - Lyons with its 25 000 metres was so far the maximum. So the amateurs were restricted to short waves, and, as you know, these are now used exclusively for long distance work.

I hope you find these memories of a few early beginnings interesting. The prevailing impression on my mind, as I have been writing about them is the tremendous rush which seems to have set in since the end of last century. That is perceptible too in other directions, in the reluctance with which old fashioned ideas are were relinquished for modern inventions I have had several experiences, more or less humorous, but sometimes quite annoying, in that respect, & have no doubt that you have come across similar troubles - But now I have given you an "earful" as the Americans say, & subscribe myself

yours sincerely
Edmund Cooke