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FRIDAY, JULY 11, 1924.

All communications for the Society should be addressed to the Secretary, John Street, Adelphi, W.C. 2.

NOTICE.

INDIAN SECTION.

MONDAY, 30th JUNE, 1924; RT. HON. THE EARL OF RONALDSHAY, G.C.S.I., G.C.I.E., in the chair.

A paper on "The Art of the Pal Empire in Bengal" was read by MR. J. C. FRENCH, I.C.S.

The paper and discussion will be published in a subsequent number of the *Journal.*

PROCEEDINGS OF THE SOCIETY.

FOURTEENTH ORDINARY MEETING.

WEDNESDAY, MARCH 12TH, 1924.

SIR HERBERT JACKSON, K.B.E., F.R.S., in the chair.

The paper read was :—

PERSONAL RECOLLECTIONS OF SOME NOTABLE SCIENTIFIC MEN.

(Illustrated by photographs).

By ALAN A. CAMPBELL SWINTON, F.R.S.

(Late Chairman of Council).

Some years before the war I was giving a Friday evening discourse at the Royal Institution upon Electricity Supply. Some of you may know that the methods adopted at the Royal Institution on Friday evenings are rather peculiar. The Chairman takes his seat before the lecturer enters the lecture hall, but, save that he sits in the Chair, the Chairman takes no part in the proceedings. When the lecturer comes in, as he does when the clock strikes one—the Royal Institution clock is a very special one, inasmuch as it never strikes anything but one—he is always immediately followed by the resident Professor, who comes in by another door. The resident Professor for many years was the late Sir James Dewar. On the occasion in question, while we were waiting outside the lecture theatre for the clock to strike, Sir James Dewar said to me, "You see, I am here to do my duty." "What is that ?" I asked. "My duty," he said, "is to see that the lecturer does not run away." "Why," I asked, "has that ever occurred ?" "Oh, yes," he replied, "Professor Wheatstone was left alone on one occasion, and just before the lecture was about to begin he got frightened and ran away and hid himself, and Faraday had to give an extempore lecture in his place."

Well, I have had no chance to run away to-night, although I might have wished to do so ; for when this lecture was announced, a very well-known Professor of Chemistry expressed his surprise at its nature, and said that he had no idea that I had any experience of giving lectures of a biographical kind. Well, let me confess at once, I have no such experience, at any rate before an audience like this, and this lecture is an experiment "*in corpore vili*" where this audience are the victims.

The first scientific man I ever met was Professor Huxley, the great protagonist of Darwinism. In 1877 he happened to be sitting on a Royal Commission on Scottish Education with my father, and my father asked him to stay for a few days at my old home at Kimmerghame, in Scotland. His visit caused some considerable stir in the neighbourhood. I can almost remember the actual words of our head gardener, who was a very intelligent individual, when he said he could not understand how Mr. Swinton, a God-fearing man, an Elder of the Kirk, and a member of the General Assembly, could ask to his house such a notorious unbeliever. I remember also that our old Scottish nurse was very much concerned about the visit, and after family prayers, which we used to have every morning, and at which Professor Huxley was present, this dear old lady in a tremulous voice asked me, as I had been kneeling next to the Professor, if I had noticed whether he had joined in repeating the Lord's Prayer. This shows how times have changed, for I do not think that men like Huxley are looked at askance in the same way now.

Lord Armstrong.

It was not until some years later that I met other scientific men. I was apprenticed to Lord Armstrong (then Sir William Armstrong) and in 1882, I entered his celebrated works at Elswick, in Newcastle-on-Tyne. Sir William Armstrong was a very remarkable man. He is chiefly known for his invention of the hydraulic crane, accumulator and other machinery and for the famous Armstrong gun, but he was originally a practising solicitor. He first achieved fame by investigating some curious electrical phenomena which had been observed at Cramlington Colliery, near Newcastle, in which electrical sparks were obtained from the steam escaping from the safety valve. Due to this investigation he invented what is known as the Armstrong hydro-electric machine, and attracted the attention of Faraday, and was elected a Fellow of the Royal Society. He continued, however, in the practice of the law until he was 35 years of age, when he turned to engineering, and started the famous Elswick Works. At a later period, during the Crimean war, his attention having been turned to the very deficient arrangements that then obtained with regard to gunnery, he developed his famous gun. Of course, when I first came in contact with him he was a comparatively old man—72 or 73—but he lived until he was 90 years old, and during the latter part of his life I used to see him fairly frequently, because he took again in his old age to his original electrical hobbies, and I, who lived in London, used to get his apparatus made for him and used to go and see him at his beautiful home, Cragside, in Northumberland. The illustration is a photograph which I took of him in 1891, when he was 81 years of age. I remember him teling me that he had been delicate as a boy, and that when he married, at the age of 25, he could not get any Insurance Company to insure his life because they said he had heart disease. He was very original and precise in his ideas, and on one occasion he told me that he thought all poetry to be poor stuff. He had never received any training as an engineer, and he could not draw at all. When I had the task of getting things made for him it was somewhat of a difficulty for him to describe what he wanted without resorting to drawing, but of drawing he was quite incapable. For an engineer not to be able to draw is certainly very peculiar. He was a great organiser and a shrewd judge of character. Though no mathematician, he had a remarkable faculty for intuitively getting to the bottom of things. He was also a pioneer in many directions. His house at Cragside was one of the first houses to be lighted by electricity, and he also had in

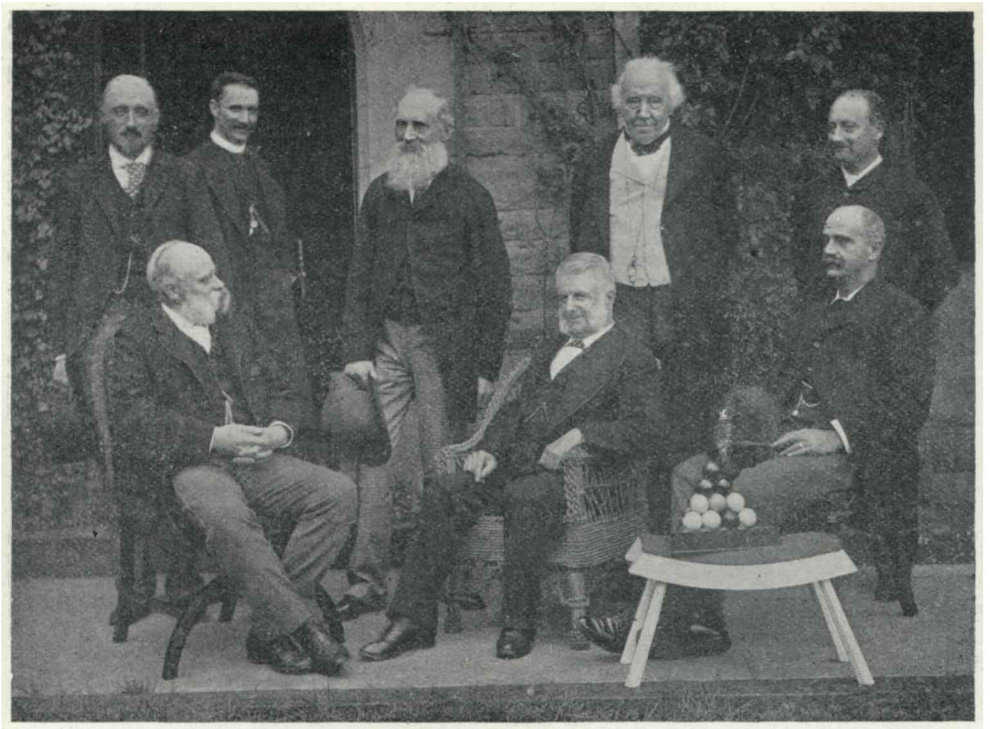
Sir Andrew Noble.

his grounds what I think was the first hydro-electric installation in this country and the first transmission of considerable quantities of electric energy over a fairly long distance.

It was in 1887 that I took the photograph of Captain (afterwards Sir Andrew) Noble, who was Lord Armstrong's right-hand man for many years, and afterwards succeeded him as Chairman of Messrs. Armstrong, Whitworth & Co. Noble was a profound mathematician and a living encyclopedia on all subjects, besides being the hardest working man I ever came across. He must have had a wonderful constitution, as he used to work fifteen to eighteen hours a day; then travel up to London by night and do the same thing next day. Like Lord Armstrong, who received the Albert Medal of this Society in the year 1878, Sir Andrew Noble received the same distinction in 1909. Lord Armstrong used to say that there was only one worse draughtsman at Elswick than himself, and that was Sir Andrew Noble.

I next show a group of scientific men taken by myself at Sir Andrew Noble's house at Jesmond, Newcastle, on the occasion of the Newcastle Meeting of the British Association in 1889. In addition to Sir Andrew himself, it includes Lord Kelvin, Professor Osborne Reynolds, who had a theory of matter to the effect that everything consisted of hard corpuscles, illustrated in the picture by a heap of billiard balls, and Sir Frederick Abel, the well-known chemist, who was one of the inventors of cordite and of the Abel fuse and one of the earliest people to put gun-cotton into practical use. He was a good friend to this Society, and was at one time Chairman of its Council. Another figure in this picture is Sir Frederick Bramwell, who also took great interest in this Society. Again, we have Sir William Abney, the great photographic expert, Sir George Baden-Powell, the elder brother of the founder of the Boy Scouts, and Captain Casella, of the Royal Italian Navy. There are many things that one could say about some of these people.

First of all let me say a few words about Sir Frederick Bramwell. He was a great character, and there are many stories told about him. I was told only the other day that he was the actual inventor of the well-known story which makes one man go up to another and say, "Have you heard? Rothschild has bought the *Times*." "Oh, is that so? What did he pay for it? It must have been a large sum." "Oh no, only 3d." His advice to after-dinner speakers to



Prof. Osborne Reynolds. Capt. Casella. Lord Kelvin. Sir F. Bramwell. Sir G. Baden-Powell.
Sir Andrew Noble. Sir Frederick Abel. Sir William Abney.

"Get up, speak up, and shut up," was at any rate sound. He had an elder brother, Lord Bramwell, a judge, who divided liars into four classes—liars, damned liars, expert witnesses, and "my brother Fred." This recalls the riddle of Biblical connexion that was invented in the early eighties, after a celebrated patent law action, concerning the telephone, at which there was much contradictory expert evidence. "Why did Ananias stand forth?" was the question, and the answer, "Because Bramwell stood first, Thomson stood second, Hopkinson stood third, so Ananias could only stand fourth."

Sir Frederick Bramwell was a great expert witness and he was also something of an actor. On one occasion when it was necessary to his side of the case to prove that a minute was a very long period of time, he suddenly, while giving his evidence, stopped short in the middle of a sentence. Nothing happened, all was silence and one could have heard a pin drop; counsel fidgeted with their papers, the Committee thought that Sir Frederick must have been taken ill; we know how interminable a minute can seem under such circumstances, and when the minute had expired, he merely said, "I have been silent for precisely one minute." It was a very effective way of showing how long a period one minute is. On another occasion he paralysed a cross-examining counsel by saying that he would answer counsel's question, if counsel could tell him what was the distance between Westminster Bridge and Christmas. Another story is this: He was employed by someone on special business and sent in his bill, which the client thought was moderate. This being so, after a time his client employed him again and got a "whopping" bill. Meanwhile, Sir Frederick Bramwell had been elected a Fellow of the Royal Society, and had received the honour of Knighthood, so that when the client wrote and expostulated, Bramwell replied, "You should have noticed those three letters after my name, F.R.S., they mean 'fees raised since' and besides that, you have now got to pay for 'Knight' work."

Bramwell, as can be seen from his portrait, was built on a generous scale with portly dimensions and a very fine presence, hence it was not out of place when someone in proposing a vote of thanks alluded to him as "our worthy member who so fittingly fills

and so fillingly fits the presidential chair ! "

Next we come to Lord Kelvin, one of the most remarkable men of the last century. The first time I ever met him was when I was taken to see him in his laboratory in 1882, when he had just lighted up his house by electricity. I suppose I must have suggested that electrical engineering might have a great future, and be a good business to take up, but he replied, " Oh no, it will never be more than a plumber's job." And he gave similar advice to other people. Only to-day I was told a story by Sir Joseph Thomson, which rather illustrates the same aspect of his character. Lord Kelvin was asked to join the Marconi Company in its early days, and in telling someone else, he said, " Yes, I have accepted, but I made it a condition that their capital is not to be more than £100,000, because no wireless telegraph company can ever want any more money than that. "

It is curious that this great man was not able to foresee any better. Lord Kelvin never read any books, at all events in his later years. He used to get all his information by talking to people. He was a most kindly man. I remember one story about him which was told me by Sir William Ramsay, who was a student in Lord Kelvin's laboratory. On one occasion Lord Kelvin wished to charge up a very large Leyden jar that he had. Now a charged Leyden jar is a thing with which one has to be careful ; Lord Kelvin, unfortunately, took hold of the Leyden jar by the knob and charged it up, and after he had done so, he suddenly realised that he now could not put it down. If he had placed it on the floor or on a table he would have received a severe shock, and if he had dropped it he would have smashed it to pieces. I think they had to get a net or something of that kind into which Lord Kelvin was able to drop the Leyden jar, but the spectacle of the great man holding on to the jar of which he dared not leave go must have been a funny one. Lord Kelvin also received the Albert Medal of this Society in 1879.

I will next refer to Alexander Graham Bell, the original inventor of the telephone, which he perfected in 1876. In the United States they always claim Bell as an American, but as a matter of fact he was a Scotsman, born in Edinburgh, in 1847, and as he told me himself, he invented the idea of the telephone in Canada, though he did not get it actually made until he went to the United States, where later, he became naturalised as an American citizen. He was a remarkable old man, and he did other things besides inventing the telephone. As some of you may remember, the phonograph, as originally invented by Edison, in which the sounds were recorded by indenting a piece of tinfoil, was a very crude affair. Bell received in connexion with the telephone a money prize of considerable value, and he told me that he determined to utilise this amount in doing something useful. After consideration, what he set himself to do was to improve Edison's phonograph, and it was Bell, in conjunction with a friend of his called Tainter, who conceived the idea, instead of indenting tin foil, of cutting a record with a sharp cutter upon wax, which is the basis of all modern phonographic and gramophone records. Bell was no business man himself, and I presume that, had he been left to his own devices, he would never have made any money out of the telephone. I do not think he even realised that there was any commercial value in it. He had, however, married a lady who was deaf and dumb ; and her father, Mr. Hubbard, was a very clever business man, with the result that Bell's father-in-law, by putting the telephone to commercial use, made a very large fortune, which in time became Mrs. Bell's. Bell, therefore, died the husband of a very rich woman, the money having been made through his own invention, and yet not made by himself. Bell received the Albert Medal of this Society in 1902. I met Graham Bell in London, in 1907, when he sketched for me his recollection of his first telephone. He was a very modest man, and on that occasion he said to me, " I do not pretend to be an electrician, in fact, my friends tell me I could not be one, because if I had been one I should have known beforehand that my telephone would never work."

Mr. Edison improved upon the Bell telephone as far as the transmitter is concerned. When we use the telephone to-day, the receiving instrument which we put to our ears is practically exactly as Bell left it, but the ordinary microphone transmitter is partly the invention of Mr. Edison. Of course, Mr. Edison did more than improve the telephone transmitter. He invented the phonograph, which is a notable achievement, and he was one of the original makers of successful incandescent electric lamps. It is a curious thing to look back now to the

early days of the incandescent electric lamp, and to remember how Edison and Swan made filaments out of such an intractable material as carbon. Mr. Edison tried platinum, iridium and other metals, and then he had recourse to carbon. Now, of course, everybody has gone back to the metallic filament. Tungsten in a metallic form, I suppose, was not known in those early days of Swan and Edison.

Sir Joseph Swan was contemporaneous with Mr. Edison—in fact, even before him—in the invention of the carbon filament electric lamp. Perhaps I should say they were neck and neck when it came to commercial lamps, but as a matter of fact it was Swan who showed electric lamps in a lecture at Newcastle four or five years before Edison was in the field, though nothing came of it, and it found no commercial application. Swan was also one of the inventors of the carbon process of photography. He was President of the Institution of Electrical Engineers and received the Albert Medal of this Society in 1906. With his long silver hair, and flowing snowy beard he was a most picturesque person.

David Hughes was one of the original inventors of type-printing telegraphs. The ordinary tape machine at clubs and hotels is very much based on his work. He invented his printing telegraph while in America, but he was a Welshman born in London, and went out to America at an early age. He is usually known as Professor Hughes, but he was a professor, not of engineering or physics, but of music. After having got his telegraph taken up all over the continent, he came back and lived in this country. In 1878 he invented the microphone, and, as we now know, he made experiments in wireless telegraphy some years before the Hertzian waves had been discovered by Hertz. Hughes lived in a small flat off the Tottenham Court Road, and he and his wife—a quaint old couple—lived so economically that I do not suppose they ever spent more than £500 a year. I remember once suggesting to him on a wet night that I should fetch a cab to take him home, and he said to me, "Cab! Oh no, I cannot afford cabs." Shortly afterwards when he died he left something like three-quarters of a million sterling to the London Hospitals. After his death, Mrs. Hughes, who was an American, went back to live in the States, and two or three years ago she died and left her husband's notebooks to the British Museum, which did not quite know what to make of them. Finally, the Museum authorities sent them to me to advise whether they ought to be accepted. I happened to know that Hughes had made experiments in wireless telegraphy which had never been published, and I thought it might be possible to find something in those notebooks. In this I was successful and I told the British Museum that I thought they ought to be preserved, as I found in them a complete account of Hughes's experiments in wireless telegraphy. He had evidently carried on wireless telegraphy up to distances of some hundreds of yards. He had a clockwork apparatus by which he sent wireless signals, and he used to walk down the street with a telephone connected to some sort of cohering arrangement applied to his ear, to see over what distances he could get the signals. He succeeded in obtaining what was actually wireless telegraphy but his ideas about the phenomena were all wrong, because he thought it was a case of electrical conduction through the air. This, of course, was before the date of Hertz's discovery of the electro-magnetic waves called by his name—waves, the existence of which had been predicted by Clerk Maxwell. After perusing Hughes's notebooks it occurred to me that at some time or other he must have possessed a quantity of apparatus, so I enquired as to where these notebooks had been found. I was shown a fearful mass of rubbish in a pantechnicon off the Tottenham Court Road. There were two rooms full of old clothes, old boots and umbrellas, and masses of books and old newspapers. I went to Colonel Lyons, the Director of the South Kensington Science Museum, and he undertook to look through all this, provided if anything of interest was found it was to go to the Science Museum. As a result, a number of Hughes's original microphones and various forms of telephone receivers evidently made with his own hands, and the apparatus with which he had conducted experiments in wireless telegraphy, all in accordance with, and all readily recognised from the sketches in his notebooks, were discovered, and have now been placed in the Science Museum, where they have formed a most interesting exhibit.

It was from the late Sir William Crookes that I had heard of Hughes's wireless experiments, Sir William Crookes having been shown them in confidence by Hughes

shortly after the experiments were first made.

Sir William Crookes was a great chemist, and of him, Lord Kelvin once said that he had never known any man start as many scientific hares, meaning that Crookes had originated a great many new ideas in science which others had advantageously pursued. As is well known, he was an early believer and investigator in spiritualism, so much so, that, whereas when he was knighted and he had taken as his motto in connexion with his coat of arms the medieval proverb "Ubi Crux ibi Lux," this being a pun on his own name, some wit at one of the Red Lion dinners of the British Association altered the motto to, "Ubi Crookes ibi Spooks."

It was Sir William Crookes's investigations into the phenomena of electric discharge in high vacua, and his investigations into what he called radiant matter, that formed the first beginnings that gave rise to all the modern theory concerning the atom. Crookes also wrote a remarkable article for the *Fortnightly Review* in 1892, in which he gave a wonderfully accurate forecast of what might be done in the way of wireless telegraphy by means of Hertzian waves. No doubt, in part, he had got his ideas in this from Hughes's experiments, which, as already mentioned, he had witnessed, but his forecast went a long way beyond what Hughes had done, and it must be remembered that the article was published years before Lodge or Marconi had made any of their earliest experiments.

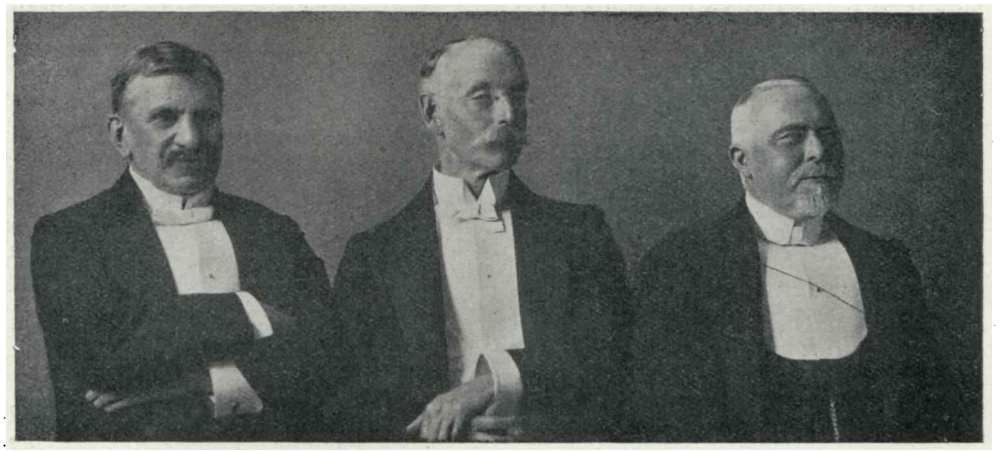
It was with one of Crookes's cathode ray tubes that Professor Röntgen, in 1895, discovered the X-Rays that are now known by his name. When these rays were first discovered they caused an immense amount of popular curiosity, particularly their property of enabling bones in the living person to be photographed. I possessed an early photograph of this description, the subject being my own hand, which, when the subject was new, interested people very much. I remember going one night to a club which used to meet at the Grafton Galleries on Sunday evenings, and showing the photograph to the late Lord Crawford, who was a well-known scientific amateur. It was the first time he had seen one of these photographs and he was very much interested in it. He told me that the Prince of Wales (afterwards Edward VII.) would be coming to the club shortly and he would like to show him the photograph, as it would be sure to interest him. This he did, but the only remark that the Prince made on being shown this latest scientific wonder were the words, "How disgusting!"

Shortly after Röntgen's discovery of the X-Rays, one of the most curious episodes in the history of modern science took place in France. Professor Blondlot, a well-known professor of Physics at Nancy, who had done excellent work in other directions, announced that he had discovered another and new description of radiation, which he named the N-rays. With these rays, which he stated were emitted by nearly all bodies in a state of strain, he claimed that he could see in the dark, and with them he even professed to be able to produce a line spectrum. Sir William Crookes and others in this country tried to repeat Blondlot's experiments, but no one had any real success. I can well remember my own exceeding disappointment at my failure to obtain any result after prolonged and strenuous endeavours. Sir William Crookes even went out to Nancy specially to see the rays, but came back quite unconvinced as to their existence. However, a number of distinguished French men of science continued to believe in them, and the Académie des Sciences of France solemnly presented Professor Blondlot with a gold medal for his discovery.

Shortly after this Professor R. W. Wood, of the John Hopkins University, Baltimore, came on a visit to Europe and thought he would like to see these remarkable rays. I do not think the sequel has ever been published, but I have it from Professor Wood himself. He went to France and was shown the spectrum of the N-Rays produced by means of a prism. Professor Wood himself could see nothing, but the French scientists assembled at the gathering saw, or at any rate professed to see, the spectrum, and the remarkable thing was that they continued to see it even after Professor Wood, taking advantage of the complete darkness in which the experiments were being shown, had surreptitiously removed the prism out of the apparatus and put in his pocket. Nowadays one never hears of the N-Rays, and I do not think you will even find them mentioned in any modern scientific book. Probably the phenomena were due to some peculiar form of self-hypnotism. No doubt the observers were perfectly genuine, but what they saw or thought they saw was subjective and not

objective. Anyway, Professor Wood, by his perhaps rather venturesome action, gave the N-Rays their quietus.

One of the greatest inventions of modern times is the steam turbine, the advent of which has not only revolutionised the generation of electricity on a large scale, but has also revolutionised the propulsion of big ships, rendering possible for the first time such monsters of the deep as the "Mauretania" and the "Lusitania," and such huge war vessels as the "Dreadnought" and her successors. The next illustration is a photograph, taken in 1911 at my house after dinner, by electric light, of Sir Charles Parsons, the inventor of the steam turbine,



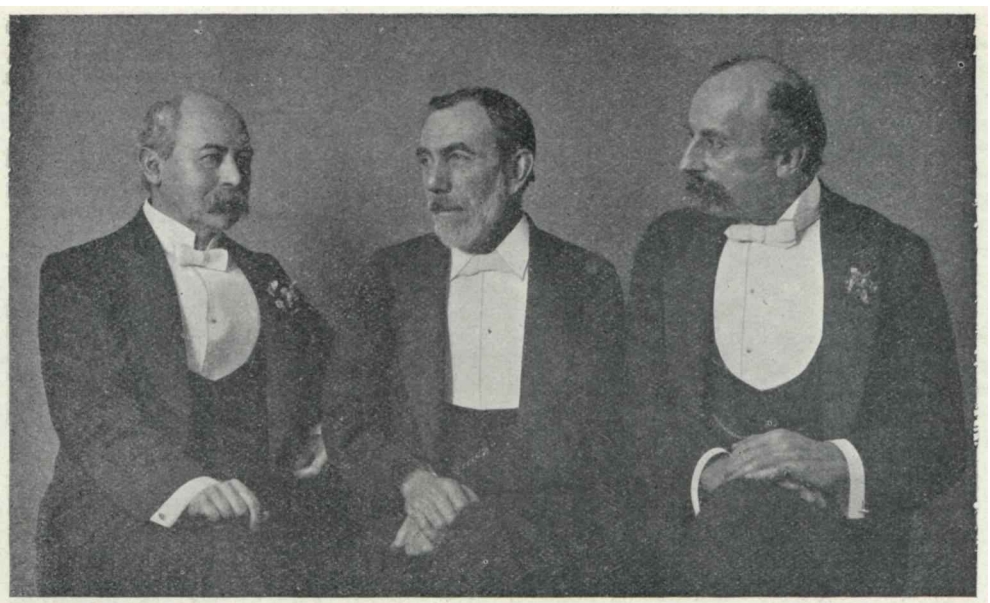
Sir Philip Watts. Sir Charles Parsons. Sir William White.

with the two engineers who did more than anyone else to introduce turbine propulsion into the Navy—Sir William White, who was Chief Constructor of the Navy when, the turbine was first adopted for Torpedo Boat Destroyers and fast cruisers, and his successor as Chief Constructor, Sir Philip Watts, who designed the original Battleship, "Dreadnought," and many other large turbine driven ships of war. In addition to his eminence as a naval architect, Sir William White possessed remarkable powers of exposition both in speech and in writing. He once told me that as a youth he had been driven to take up engineering as a profession by the necessity of earning his own livelihood, but that, if he could have afforded it, he would have preferred to have embraced a literary career. Sir Charles Parsons received the Albert Medal of the Society in the year my photograph was taken, while Sir William White was Chairman of the Council of this Society in 1908-9, and Sir Philip Watts is at present one of our Councillors.

My last illustration is another photograph, taken in 1912 in my house, of Professor Silvanus Thompson, Sir William Ramsay, and Mr. A. P. Trotter. When Professor Thompson died, in 1916, I contributed to *Nature* an obituary notice which I hope did justice in some slight measure to his untiring industry and his many conspicuous qualities both of heart and head. A few days after the notice was published an old and very well known member of the Athenæum came up to me in that club and said, "That was a nice obituary notice; I hope that when my time comes you will do as much for me." An irreverent friend, to whom I told this said, "You should have replied, 'Well if you want that you had better hurry up, because I am not feeling very well myself'."

Another little story occurs to me with regard to Mr. Trotter. He came one day to lunch at the Athenæum and when he joined me at the table he exclaimed, "I will never again help on anyone with his coat." On my asking why this sudden resolution, he replied, "A few minutes ago I saw an old gentleman in the hall struggling with his coat, so I helped him on with it, when he turned round and said so sweetly, 'Thank you so very much, but I was trying to take it off'."

In the pages of that useful periodical, *Who's Who*, it is common to state the particular recreation to which the various persons of whom particulars are given are addicted. If you look up Mr. A. P. Trotter you will find that he was for many years



Prof. Silvanus Thompson. Sir William Ramsay. Mr. A. P. Trotter.

adviser on electrical matters to the Board of Trade, and that his recreation is now "remembering that he is no longer a Government official."

Thus ends my first experiment in personal biography. I hope that at any rate it has sounded no jarring note.

[A complete list of the photographic portraits, mostly taken by Mr. Swinton himself, that were shown in the lantern at the reading of this paper is as follows :—

Professor Huxley, Lord Armstrong, Sir Andrew Noble, Professor Osborne Reynolds, Captain Casella, Lord Kelvin, Sir Frederick Bramwell, Sir G. Baden-Powell, Sir Frederick Abel, Sir William Abney, Sir Philip Watts, Sir Charles Parsons, Sir William White, Professor Silvanus Thompson, Sir William Ramsay, A. P. Trotter, Professor David Hughes, Sir William Crookes, Sir William Preece, Sir James Dewar, Alexander Graham Bell, Thomas Alva Edison, Sir Joseph Swan, Dr. Anderson, Lord Rayleigh, Sir J. J. Thomson, W. Duddell, Professor Vernon Boys, Arnulph Mallock, Professor R. W. Wood, Sir Alfred Ewing, Sir Dugald Clerk, Sir Oliver Lodge, Senator Marconi, Professor J. A. Fleming, V. Poulson, Professor Pedersen, General Ferrié, George Westinghouse, Colonel Crompton, Professor John Perry, General Sir Ernest Swinton, the Archbishop of Canterbury, Sir William Bragg, Sir Joseph Petavel, Sir Joseph Larmor, J. H. Jeans, Sir Richard Glazebrook, Major A. P. MacMahon, Professor A. A. Michelson, Sir Henry Trueman Wood.]

DISCUSSION.

Dr. W. Rushton Parker said that, as a medical man, he was interested in the lecturer's remarks about Lord Armstrong having suffered from heart disease as a young man, and yet living to the age of 90. A very eminent physician once said in the speaker's presence that when he was assistant physician at one of the leading hospitals, the secretary of the institution came to him one day and was sounded by him and told that he had heart disease. The secretary told his committee of the trouble, and in those days it was thought that if a man had heart disease his days were numbered. Therefore, the committee of the hospital decided to pension him off with a couple of hundred pounds a year, and he lived for 40 years longer. It had occurred to the speaker that frequently too much attention was paid to heart troubles in connexion with longevity. On one occasion he wanted to insure his life, and he had to send in a statement of all the doctors whom he had consulted during the past few years. Having during that period suffered from a disability which was difficult of diagnosis, he had consulted no fewer than 14 eminent medical men within a few months, and with this record in front of them the company would not insure him at any price. But that was 40 years ago and he was now over 70 years of age.

Mr. William Coldstream, I.C.S., retd., said that the name of Mr. Graham Bell had been mentioned as the inventor of the telephone. It was also mentioned that he was a teacher of elocution. The speaker was a young man in Edinburgh about 65 years ago, and took lessons in elocution from the

father of Mr. Graham Bell, who was an able teacher.

MR. WILLIAM M. MORDEY, President, Institution of Electrical Engineers, said that he was able to recall Professor Hughes very well, and particularly his modesty about his work on wireless telegraphy. He showed his experiments to a number of very eminent mathematical physicists and they were puzzled, having no explanation to offer. Years afterwards, when Marconi was in the middle of his great work, the Council of the Institution of Electrical Engineers, knowing as they did of this work done by Professor Hughes, thought it would be a great thing if they could get him to contribute to their Journal some account of his early investigations. The Council deputed Professor Silvanus Thompson and himself to go and see Hughes, and ask him to allow an account of his actual experiments to be published. He discussed the matter for some time, and finally said, "No this young man Marconi is coming over here, he is going ahead, and I am not going to get up and say 'I did it.'"

MR. R. À-ABABRELTON said that the father of Alexander Graham Bell, whose name was Alexander Melville Bell, in addition to being an elocutionist, invented a system of shorthand, which was the first system of shorthand ever published in "Cassell's Popular Educator." The speaker at that time was very anxious to become a reporter and learned that system, but later had to abandon it. He was one of the few people now living who was intimately associated with Sir Isaac Pitman, and he founded the Phonetic Shorthand Writers' Association in 1872, a body which was now called the Incorporated Phonographic Society. He also wished to ask the lecturer a question with regard to the X-ray photograph of the hand, which was said to be the hand of the late Lord Salisbury. He had an impression that that photograph, or a similar one of Lord Salisbury was taken by his son, Lord Robert Cecil, now Lord Cecil, because at the time it was done, he (the speaker), happened to be Private Secretary to the present Lord Salisbury, and he knew that Lord Robert Cecil was very much interested in the taking of these photographs of hands.

MR. CAMPBELL SWINTON said that as a matter of fact he happened to meet Lord Selborne, Lord Salisbury's son-in-law, at a time when everybody was interested in bicycling. The speaker had a very peculiar bicycle which Lord Selborne desired to see, and having looked over the bicycle, he showed him the bones of his hand. A few days later he was told that Lord Salisbury would like to come and see the bones of his hand himself. Lord Salisbury came accordingly, and a day or two afterwards Lady Salisbury also came. He heard afterwards that Lord Salisbury himself had bought an X-ray apparatus for use at Hatfield. But the photograph he had shown of Lord Salisbury's hand that evening was from the speaker's own negative.

MR. ROLLO APPLEYARD, O.B.E., M.Inst. C.E., said that he would tell them a story relating to Lord Kelvin. Professor Lorentz, who came over from the Continent last year, had remarked, speaking of Lord Kelvin, that Lady Kelvin must have taken great care of him, because at a lecture at the Royal Institution when Sir James Dewar passed round a vessel of liquid air, Lorentz observed that when it was handed to Lord Kelvin, Lady Kelvin caught her husband hurriedly by the arm and whispered audibly, "Don't drink it, William." He had one other story, relating to Sir Frederick Bramwell, a very remarkable man, He had many fine characteristics, and he did everything in the grand manner. He had few enemies, and a great many friends. On one occasion Sir William Preece was taking the chair at a meeting of the Society of Arts (*vide Journal* Nov. 22, 1901, p. 22), when it fell to Sir Frederick Bramwell to propose a vote of thanks. There had been a discussion on high speed railway travel, and Sir William Preece had been remarking that he would not go down to his grave happy until he had travelled at the rate of 150 miles an hour. Sir Frederick Bramwell said that if the Chairman would fall down a coalmine 784 feet deep he would, by the time he had reached the bottom, have attained a velocity of 150 miles an hour, and would certainly go to his grave.

SIR ARCHIBALD DENNY, Bt., said that a good many years ago he was honoured by being made President of the Institution of Junior Engineers, then a very active Society. It was the greater honour for him because the Senior Vice-President was Lord Kelvin. Lord Kelvin sat next to him at the dinner of the Institution, and was such an exceedingly modest man that in talking to him one forgot his immense ability and reputation. Without thinking about it, therefore, the speaker began a sort of lecture on electricity, and suddenly he realised to whom he was talking, and said, "I beg your pardon, it is I who ought to listen to you, not you to me." "My dear Sir," said Kelvin, "you are quite wrong. Pray go on, go on! that is how I learn things."

THE CHAIRMAN (Sir Herbert Jackson) said it was a particular pleasure to him to propose a vote of thanks to Mr. Campbell Swinton. He was sure that everyone must have had a very enjoyable evening in listening to Mr. Campbell Swinton's lecture given in so pleasing and interesting a manner. It was a privilege to have had the opportunity of seeing such a number of photographs, nearly all of which had been taken by Mr. Campbell Swinton himself. Mr. Campbell Swinton had always been so thorough in the photographic work he had done; from the first exposure of the plate to the final production of the re-touched negative and the excellent prints, everything had been done by his own hands. He had had this evening time to give them only a proportion of his interesting recollections of the many prominent men of science whom he had known. Not one lecture, but a

course of lectures would be needed, but they were all greatly indebted to Mr. Campbell Swinton for what it might be hoped was only an instalment, and for the great trouble he had taken to make his lecture interesting.

Mr. Saxton Noble seconded the vote of thanks to Mr. Campbell Swinton, whom he had known for more than 40 years. He had watched Mr. Swinton's progress among these men of wisdom, and had seen him get greater and greater himself. If he had been giving a similar lecture he would have been able to add one more photograph to the collection of great scientific men, namely, that of Mr. Campbell Swinton. He had recalled to their minds many interesting and remarkable men, the sad thing being that such a number of them were no longer with them.

The motion was passed unanimously, and Mr. Campbell Swinton, after acknowledging the compliment, said that for the lantern slides he was very much indebted to the work of his Secretary, Mr. A. W. Langley.

Sir Archibald Denny writes:—I should like to add to my remarks the following.

I remember, as an apprentice, hearing about the wonders of the telephone. It must have been about the year 1878, and Mr. Graham Bell's father-in-law was surely in charge by then, for the price of telephones was very high; but I discovered a small workshop in Glasgow where they made the parts and sold them for the purchaser to put together and thus the royalty was avoided.

I purchased a couple and at that time there was no microphone, so far as I knew. I rigged them up between my brother's room and my own and we carried on conversation but the sound was very feeble. I then heard of Hughes's french-nail microphone, of which I made a couple, attached batteries and had very clear and loud conversations.

On my return from London after my college course in 1883, the telephone had made very great progress and it was in the early eighties when I first met Mr. Swinton, who had invented an excellent microphone. We contracted with his company to fit up our offices and they worked admirably. But Mr. Graham Bell's father-in-law again intervened, and after a patent law case which Mr. Swinton lost, we had to deliver up the instruments.

That was the beginning of my friendship with Mr. Swinton, which has endured ever since. He and I well remember the primitive material used in the first development of incandescent electric lighting. The first ships my firm fitted, were the "Arawa" and "Tainui" in 1883-4. The wire procurable would hardly be used for bell wiring now, and all the fittings were on an equally primitive scale, bottom loop lamps, etc., etc.

But this brought me into contact with another of our brilliant young electricians, Mr. Ferranti, as those ships were fitted with two of his ribbon armature alternating current dynamos. It was fortunate they were alternating current as we used single wiring with the skin of the ship as return, and with the inferior wire electrolysis would have set in resulting probably in disastrous fires, had the current been continuous. I need say nothing about Mr. Swinton's later career; it is well known to us all, and he takes his place among "The notable Scientific Men" I have met.

TWENTY-SECOND ORDINARY MEETING.

SEVENTH TRUEMAN WOOD LECTURE.

Wednesday, May 21st, 1924.

Sir Herbert Jackson, K.B.E., F.R.S., in the chair.

The paper read was:—

THE OUTLOOK IN CHEMISTRY.

By Sir William J. Pope, K.B.E., F.R.S., LL.D., D.Sc.

One of the many useful functions of an ancient Society such as this is undoubtedly that of taking stock, from time to time, of the actual position which has been so laboriously achieved in one or other of the large divisions of pure or applied science. This, I feel sure, is a function which would appeal particularly to the gentleman whose services to science are to be perpetually recalled to fresh generations of students of science by the Trueman Wood lectures. And so, when the Council of the Royal Society of Arts did me the honour of adding my name to the distinguished list of Trueman Wood lecturers, the opportunity seemed appropriate for directing attention more particularly to one specific branch of science in which developments of fundamental importance have quite recently taken place.

I believe, and I think my belief is well founded, that the historian of the future will mark the last twenty-five years as one of the really memorable stages of scientific progress. This brief period has witnessed such a broadening in the scientific outlook on the physical sciences as was never contemplated towards the end of last century: a broadening of the scientific horizon which has forced previously dissonant sections of the scientific community to regard their individual subjects and their main objectives of research from precisely the same standpoint of knowledge and of purpose.

Some obscurity may attach to this problem and a little explanation is desirable. During