

## X-RAYS IN SINGAPORE

### PART I. THE FIRST FIVE YEARS FROM 1896-1900\*

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#### SYNOPSIS

1. The present article, Part I of "X-rays in Singapore", deals with the early period from 1896-1900.
2. The article is divided into four sections. Section one deals briefly with the discovery of X-rays by Roentgen, and subsequent developments.
3. Section two is devoted to the views on the roentgen rays as reported in the local newspapers, of which there were 11 items in the period under review. It is of interest that the first announcement of Roentgen's discovery of X-rays appeared relatively soon in the Straits Times of February 14, 1896, which gave a full account of Roentgen's experiments before Emperor Wilhelm on January 13, 1896. The other items, in line with the trend of the early days, dealt with miscellaneous topics. Two of the earliest items jokingly linked X-rays with horses and racing. Accounts also tended to be exaggerated or dramatic in some instances, like the rapid handling of parcels in the Post Office, or the instantaneous dropping of beard following X-ray treatment.
4. The local medical profession could follow accounts of the discovery of the roentgen rays and the rapid advances made in 1896 by reading the British Medical Journal and the Lancet. Details of the relevant articles in the British Medical Journal are described in section three.
5. Section four deals with the introduction of roentgen rays locally. Due to lack of institutional records, all information had to be gleaned from local newspapers.

(a) The first roentgen ray apparatus was installed at Taiping, Perak, on February 3, 1897. Mr. Wray presided as Chairman on that memorable occasion. The Straits Times reported that this was probably the first country in the Far East to use the roentgen rays.

The Straits Times in October, 1897, reported that Messrs. Yeow Tat Shin and Li Thung of Ipoh presented a Roentgen apparatus for use in the Government Hospital at Ipoh, in commemoration of the Diamond Jubilee of the Queen.

(b) A Roentgen ray apparatus was installed in the Municipal Office, Singapore, under the charge of Dr. Middleton, the Municipal Health Officer, and an exhibition of X-rays was held on January 4, 1898. This apparatus was purchased as a Queen Reign Memorial by public subscription through the efforts of Mr. Borgaardt and Mr. Grigor Taylor, according to the Straits Times.

(c) An X-ray machine was donated by a wealthy Chinese gentleman to the Canton Hospital, Canton, according to the Straits Times of December 13, 1900.

In Singapore, there was a sudden outburst of activity towards the end of 1898 when a course of seven health lectures was arranged to be delivered at the Tanglin Club. The second lecture was delivered by Dr. Middleton on November 21, 1898, together with an X-ray demonstration. Mr. Grigor Taylor, Chairman, remarked: "Strange to say, although the Roentgen Rays were of the utmost use in surgery, the Singapore Hospital was one of the few hospitals of its class which did not possess the necessary apparatus."

\*Singapore, founded by Raffles in 1819, celebrated its 150th anniversary in 1969. Many notable public exhibitions on the development of Singapore since its founding were held in 1969. There was also a number of publications on the various facets of the history of Singapore. The present compilation is an attempt to trace how X-rays came to be introduced and used, not only in Singapore, but, whenever feasible, in Malaya and the surrounding countries of South-East Asia. It is felt that only in this

way can a more balanced perspective be gained. Due to the lack of institutional records of the early days, the writer had to depend mostly on what had been reported in the local newspapers. It was a trying task scouring every page through the years, but it was worth the while because of the information to be gleaned, though sometimes meagre. For the subsequent years from 1910 till about 1940, the official Government publication, the Straits Settlements, Annual Departmental Reports, also provided much useful information. The present article, Part I, deals with the first five years from 1896 to 1900. Parts II and III, to be presented in future issues of this Journal, will deal with the pre-World War II and the post-World War II periods respectively.

## ON THE DISCOVERY OF X-RAYS

It was on Friday, November 8, 1895, that W.C. Roentgen\*\*, Professor of Physics at the University of Würzburg, Germany, discovered the X-rays while conducting experiments on the cathode rays with a Hittorf-Crookes tube. This momentous discovery acted as a catalyst, so to speak, and was succeeded in quick succession by the discovery of radioactivity by Becquerel in 1896 and of radium by the Curies in 1898. The smug world of classical physics was rudely jolted. The age of modern atomic physics had dawned, leading to ever accelerating breathtaking developments in many fields of science, and with no end in sight as yet.

Roentgen named the mysterious rays the X-rays. These rays were found by Roentgen to penetrate opaque substances, and could blacken photographic plates as well as cause certain salts like barium platinocyanide to fluoresce†. In fact, the first X-ray photograph that Roentgen exhibited to the world was that of the hand of Mrs. Roentgen.

Within a period of about 4 months, Roentgen had discovered almost all that is known of X-rays. His findings were embodied in 3 reports, the first of which was published in Würzburg, and entitled "On a New Kind of Rays, a Preliminary Communication", on December 28, 1895. The second and third reports were submitted on March 9, 1896 and on March 10, 1897, respectively. However, the exact constitution of X-rays, which is a penetrating type of electromagnetic radiation, was not solved until postulated by Laue, and shortly confirmed experimentally by Friedrich and Knipping in 1912. The alpha, beta and gamma rays of radium and other radioactive elements engaged the attention of many scientists including Madam Curie and was finally elucidated by Rutherford in the early years of this century. The gamma rays were found to be electromagnetic waves of shorter wave length than X-rays.

Roentgen's discovery immediately aroused public attention throughout the world. The medical profession in general sensed the usefulness of X-rays in diagnosis of diseases. As usual, there were skeptics, while others were openly hostile and some even feared the evil uses the X-rays could be put to. Newspapers and magazines carried jokes, comic verses and cartoons on the X-rays. Ridiculous beliefs such as the fear that X-rays might be

used indiscriminately for spying on one's anatomy even led to the sale of X-ray proof underclothing in London. On the other hand, many fantastic suggestions were put forward from time to time on the influence of X-rays on the human mind or soul. Absurd claims were also made on the use of X-rays in the improvement of various commercial products including pearl cultivation. As is usual, reports soon emanated in various countries claiming priority to the discovery of X-rays. It was true that investigators on cathode rays had previously experienced troublesome and inexplicable fogging of photographic plates stored near their tubes. Goodspeed of Philadelphia mentioned how he unearthed a discarded radiograph made in 1890 in Pennsylvania; although disclaiming priority for the discovery of X-rays. Some even became openly hostile to Roentgen, for example Lenard, who had earlier performed experiments on the cathode rays but was unfortunate enough to miss discovering the X-rays.

The impact of Roentgen's discovery was so great it drew the attention of Emperor Wilhelm II. Roentgen was invited to give a demonstration at the Imperial Court in Berlin on January 13, 1896.

Through all the turbulence of the early days, Roentgen maintained a dignified calm. Of a reserved and reticent nature, and never given to many words, Roentgen only once consented to a public lecture. This was on January 23, 1896, before the Würzburg Physical-Medical Society. Roentgen then acknowledged the work of Hertz, Lenard and others. Albert von Kölliker, anatomist of the university, then proposed that the X-rays henceforth be named "Roentgen's rays". Roentgen gave of his work freely to the world. This enabled X-ray apparatus to be made and sold economically for research and other purposes right from the beginning. It was only appropriate that Roentgen was made the first recipient of the Nobel Prize in Physics started in 1901. Characteristically, Roentgen donated the prize money to his home university. Becquerel and the Curies were jointly awarded the Nobel Prize in Physics in 1903, for their work on radioactivity.

Medical and other scientific journals were quick to report on the discovery and uses of the X-rays in January and February of 1896. These included the British Medical Journal and the Lancet, among others. The Archives of Clinical Skiagraphy††, London, was one of the first journals devoted to X-ray photography. Hardly half a year later, following the widespread use of X-rays

\*\*We will use Roentgen instead of the original German Röntgen.

†Salts that fluoresce under the action of X-rays are called phosphors. Barium platinocyanide was originally used by Roentgen and was the basis for fluorescent or fluoroscopic screens. Improved phosphors like calcium tungstate and zinc sulphide subsequently superseded barium platinocyanide.

††Skiagraphy means shadow plus graph. In the early days X-ray records were called X-ray plates, photographs or pictures. Present day terms include radiographs and roentgenograms, among many others.

in laboratories and in industry, disturbing reports soon came from various centres of the world of a peculiar skin reaction akin to sunburn with loss of hair in some cases, in persons working with X-rays. Roentgen was greatly perturbed over this; fortunately, he was spared of any ill effects as he unknowingly employed a lead plate in his experiments. Lord Lister mentioned of the irritating and stimulating effects of X-rays. Thus was ushered the use of X-rays in the treatment of diseases.

The value of X-rays in the detection of bone injuries was soon apparent in one of the first medico-legal case of its kind in London which was reported in March, 1896.

Innovations continued to appear in the field of medical diagnosis. The intensifying screen designed by Pupin of Columbia University, New York, greatly advanced radiography. The picture of a hand by Hardeck of Vienna with veins injected very early pointed to the possibilities of contrast radiography. Thus, within the short space of a few months after the discovery of X-rays, their value in medical diagnosis was put on a firm footing. Indeed, the technological advances made during the past few decades had been so great that not even Roentgen could have foreseen it.

It is not possible to mention, not to say discuss, the great advances made in medical radiology since the early days. The induction coils and gas X-ray tubes of Roentgen's days were not only inefficient and difficult to operate but often unpredictable, and X-ray exposures required several minutes to complete. This is contrasted with the modern X-ray machine which needs only a fraction of a second per exposure. The basic improvements were due to the coming of the high tension transformer, vacuum or Coolidge tubes, improved intensifying screens, X-ray shockproof and X-ray ray proof equipment, films and other accessories. Needless to say, costs have soared greatly. Further innovations in X-ray equipment and methods of computerisation can be expected in the near future. The various uses of radioisotopes have grown beyond expectations. However, the various applications of radiology for non-medical purposes today greatly outnumber those used in medicine and the disparity will continue to increase with the passage of time.

Long as this introduction may seem, it is felt that a necessary background must be provided against which the development of radiology in this part of the world could be properly assessed. Obviously, the earliest use of the roentgen rays in Singapore was for medical diagnosis, and subsequently for X-ray treatment of certain diseases.

The accounts on X-rays to follow will be divided into three sections. The first is based on what the

local newspapers reported, the second on two medical journals which should be available locally, and finally on newspaper accounts on the introduction and use of X-rays locally.

## LOCAL PRESS COMMENTS ON THE X-RAYS

There was no way of telling how the news of Roentgen's discovery of the X-rays was first known in Singapore except through the local newspapers and perhaps through imported magazines and scientific journals.

It would seem that the first local public account of the discovery of the X-rays appeared in the Straits Times of February 14, 1896. This carried a rather full account of Roentgen's demonstration of his experiments before Emperor Wilhelm in Berlin. Quote:

## PHOTOGRAPHIC DISCOVERY

At Potsdam on January 13th Emperor Wilhelm received Professor Roentgen of Würzburg, where discovery of a new photographic medium has created much excitement in Continental scientific circles. On reading in the newspapers of the startling discovery, says Berlin's correspondent of the *Daily News*, the Emperor invited Professor Roentgen to Potsdam to show his experiments. There were present . . . The Dowager Empress Frederik and the Empress . . . Professor Roentgen, who calls these rays "X-rays", began his lecture by explaining the use of the Geissler and Crookes tubes, and then passed on to his discovery, which he demonstrated by several experiments. He photographed objects which were placed behind parcels of wood in wooden and cardboard boxes, the rays which photographed the objects passing through the wood or cardboard. He limited himself to inanimate things not "taking" on parts of the human frame. The distinguished audience followed the lecture and the experiments with the greatest attention and especially one showing the rays passing in a straight line through water without refraction. This caused the greatest astonishment; the Emperor . . . invited Professor Roentgen to supper, and remained with him and other guests, conversing about the invention till midnight, when he personally presented to Professor Roentgen the Crown Order, Second Class . . .

Following this, two of the earliest items to appear in the press jokingly made mention of X-rays but in relation to horses and racing. The first one was in the Straits Times of May 23, 1896,

and referred to a letter written by Dr. Leonard Bradden. Quote:

He discourses on 'X', the Seremban Meeting and Things in general. Correspondent signs himself "X" in "Sporting Notes" a Sungei Ujong and Jelevu Gymkhana Club... What claim "X" has to be considered as an authority upon sporting, or other matters, we do not know; but as the rays of Professor Roentgen's great discovery reveal the skeleton behind the flesh; so, perhaps, the peculiar sparks of intelligence emitted by "X" may enable us to gain a notion of the shadowy judgement covered by the *nom de plume*...

The other was an item under Verandah of the Straits Times of June 20, 1896. Quote:

The dear old lady, who writes her exceedingly interesting household notes, has given us, this week a valuable contribution on the care of horses... The instruction given us to inquire, on purchasing a horse, how much food it has been accustomed to... is scarcely sound counsel. I bought a quadruped of sorts lately—true, the price was very small—and "X" rays were not required to delineate its ancestry...

The fourth account came from the Free Press of June 27, 1896. Quote:

#### THE ROENTGEN RAYS

The General Electric Association (Berlin) announces that they have succeeded in so improving the Roentgen tubes as to render it possible for the internal structure of the head, the larynx, and especially the action of the respiratory organs and heart to be observed direct on the fluorescent screen...

The fifth item of the year came from the Straits Times of July 9, 1896.

Under the caption of "The Romance of Photography", the article stated that among the discoveries of the nineteenth century, Professor Roentgen's photography bade fair to prove among the most important. It said that the ability to open something hidden from the eyes opened up possibilities for the future calculated for those who were at all inclined to be superstitious... It might prove to be a very dangerous weapon in the hands of the unscrupulous, and it would assuredly tend to destroy some portion of the privacy of domestic and individual existence... For the surgeon and the lawyer the discovery might mean great things... to the novelist, whose material was getting more and more threadbare, it would unquestionably come as a boon and blessing...

The sixth article came from the Free Press of August 17, 1896, under the heading "Roentgen's Rays".

This dwelt on the effect of the Roentgen Rays in a recent home paper in which a certain Dr. Levy, who had been engaged upon experiments found the roentgen rays of therapeutic value in the treatment of eczema and other chronic diseases of the skin.

A seventh announcement on "Roentgen Rays" appeared in the Straits Times of July 14, 1897.

It reported that Prof. Benedict, of Vienna, found X-rays useful in the detection of internal disease, namely, for the heart, lungs, stomach and kidneys.

The eighth announcement came from the Straits Times of June 1, 1899, under the title of Roentgen Rays in Soudan. It mentioned of the experience on the use of roentgen rays in the battle at Omdurman, which method was found superior in the localisation of bullets than the usual method of probing.

The ninth note came from the Free Press of July 13, 1899, which carried the following report:

#### MARKS A NEW ERA IN MEDICINE

Chicago Physician makes a wonderful discovery in using the X-ray.

Chicago May 23rd—Dr. Walter B. Medcalf reported use of bismuth emulsion for examination of the stomach and alimentary tract...

The tenth communication came from the Straits Times of June 16, 1900. Quote:

#### THE ROENTGEN RAZOR

It seemed that the office of the Barber surgeon was to be revived again, and that under distinguished auspices. At the London Hospital for Diseases of Skin (according to the Pall Mall Gazette) was described how a woman with a well-grown beard was placed on a couch; her face was covered by a leaden mask with an aperture (her chest was also protected). A buzzing noise was heard as the electric current was turned on... the darkened room was lit by the ghastly, greenish light of the Roentgen rays for 15 minutes. The patient rose—"A great portion of the beard on one face had already dropped; it had dried away like sun-dried hay... This was the first hint of the therapeutic value of X-rays".

#### Comment

The description that the hair had immediately dropped would appear to be exaggerated, as it

usually requires a few weeks for the desired effect to take place.

An eleventh article in the Straits Times of September 9, 1900 carried this item. Quote:

### POSTAL ROENTGEN RAYS

According to a member of the Roentgen Society, the Post Office authorities make considerable use of the Roentgen Rays. They handle parcel after parcel with lightning rapidity along a slab, can see in a moment if there is anything that ought not to be in the parcel. Some time ago an extensive trade was done in smuggling watches inside Bibles, but the Roentgen Rays have now put an end to this ingenious fraud on the Customs revenue.

#### Comment

The report probably came from London, and would appear to be exaggerated in regard to the speed of handling of parcels.

Finally, the Straits Times of December 3, 1900 noted that the Rumford Medal of 1900 was awarded by the Royal Society to Prof. Becquerel for discoveries in radiation proceeding from uranium.

#### Comment

In contrast to the wide publicity given to the discovery of the X-rays, Becquerel's work on radioactivity hardly stirred the world. It was only in 1903 that articles on radium and on radioactivity first began to appear in the British Medical Journal and the Lancet, and the work of the Curies mentioned.

### WHAT THE JOURNALS SAY

For the local medical profession, it would appear that ample coverage of the development of the roentgen rays could be obtained from the British Medical Journal and the Lancet, both published in London. A perusal of the British Medical Journal, 1896, showed many items relating to the roentgen rays even in those early days.

#### A. British Medical Journal

The first communication was in the January 18, 1896 issue of the British Medical Journal. This was written by Arthur Schuster, Professor of Physics at Manchester. It stated that Prof. Roentgen, of Würzburg, announced the discovery of remarkable photographic effects which was ascribed to a new kind of radiation, although it was then impossible to say what the new radiation would turn out to be.

The second item, in the same issue, noted that at the meeting of the Physical and of the Physiological Society, in Berlin, Professor Roentgen's astonishing discovery was the topic of the hour.

In the third article dated January 25, 1896, under "The New Kind of Radiation", was published an X-ray photograph of the arm of Mr. Swinton, an electrical engineer, taken with the assistance of Mr. Stanton.

The fourth report on February 1, 1896, was a lengthy Editorial, bearing the heading "The New Photography". It remarked that it had been some time since a scientific discovery of real importance had excited so much interest and popular attention as Roentgen's recent work on certain hitherto unknown rays of light, had done. There was a description of rays and apparatus. It said that the most marked use of the rays would be in diseases of the bone. It mentioned the photographs taken by Prof. Mosetig of Vienna which showed with the greatest clearness and precision the injuries caused by a revolver shot of a man's hand and the position of the projectile; that Prof. Lannelongue of Paris had taken several negatives of human limbs and one which showed a tuberculosis affection of the bone in a child's hand. There was also a discussion on the physical nature of the rays.

Besides the above, there were many short articles and case reports, as well as letters. Of great interest was a series of 17 articles designed to keep readers informed of the latest advances in X-rays written by Mr. Sidney Roland, B.A., a work commissioned by the British Medical Journal. Fifteen of the articles were published in 1896, and the last article in 1897, under the title of "Report on the Application of the New Photography to Medicine and Surgery". The first instalment was dated February 8, 1896. Various topics on the Roentgen rays were described, including physics, description of apparatus, especially improved X-ray tubes made by Messrs. Newton & Co. The cryptoscope of Prof. Salvioni of Perugia was mentioned. This was a screen impregnated with some phosphor, and somewhat similar to screens made by others, and subsequently termed a fluorescent screen. This was not only used for fluoroscopy but also to enhance radiography, but utilising only one screen. The work of Edison, the American inventor, was mentioned. Edison found that tungstate of soda fluoresced more brilliantly than barium platinocyanide. Most of the uses of roentgen rays dwelt on radiography of the extremities and bones, with particular stress on localisation of opaque foreign bodies. Fractures, dislocations, arthritis, infections, and even sarcoma of bone were diagnosed with the aid of X-rays. Subsequently, attention was paid

to examination of the thorax and abdomen. Kidney and gallstones which had been removed had X-rays; subsequently attempts were made to demonstrate stones in patients, and faint shadows were recorded in two cases. In those early days, an X-ray of the larynx required 6 minutes, and that of the abdomen 14 minutes. The need of improved equipment for reducing the exposure was felt necessary for skiagraphy of deeper parts, as remarked on May 16, 1896. Fluoroscopy was therefore preferred for certain types of X-ray examinations because of the difficulty of obtaining satisfactory X-ray plates. The work of Dr. Scharwald of Frieberg on the relative opacity of haloid elements was quoted—this foreshadowed the use of opaque media for contrast radiography. Mention was made of experiments by various workers on the effect of X-rays on bacteria but without result. X-rays were even recommended for veterinary practice. Errors of interpretation of the skiagraphic appearance was mentioned in the June 6 issue. Rowland, on December 5, 1896, quoted one observer, writing in *Nature*, who noted skin effects and black nails on himself following exposure to X-rays.

A case of dermatitis from roentgen rays was reported by Cracker in the January 2, 1897 issue of the *British Medical Journal*. This article contained a full page coloured diagram (chromolithograph) of dermatitis of the abdomen of a young male following radiography of the spine that required an hour's exposure. The author remarked that many scientific advances might confer benefit as well as injury, and that X-rays appeared to be no exception.

## B. *Lancet*

There were many useful articles in the *Lancet* of 1896 on the roentgen rays. The first article appeared as a short editorial dated January 11, 1896.

## THE FIRST ROENTGEN RAY UNITS IN MALAYA AND SINGAPORE

There are no official records of equipment purchased in the General Hospital, Singapore, or of other institutions available. Those members of the medical profession in active service in the early days could not be traced. Thus the only recourse was to fall back on accounts from newspapers.

### 1. *Perak the First State to instal a Roentgen Ray Apparatus, on February 13, 1897*

It would appear that Perak was the first state to instal a roentgen ray apparatus, according to the *Straits Times* of February 16, 1897. Quote:

## ROENTGEN RAYS

### Shadow Photography in Perak

At a meeting of the Perak Amateur Photographic Society at Taiping, on the 3rd instant, the Chairman, Mr. Wray, produced a Roentgen ray apparatus. Perak is said to be the first country in the Far East where the new photography has gained a footing. The apparatus used was an induction coil, the tube being one of Professor Jackson's. Mr. Wray began operating on a fish (ikan bawal) with success, the image development exhibiting most faithfully the bones constituting the fish. Then the rays were turned upon the fractured hand of one of the audience, Mr. Pourlier, who had met with an accident at cricket sixteen months ago. The resulting picture fully answered the expectations. It is understood that the hospital in Perak will shortly be provided with Roentgen apparatus.

### Comment

It is of interest to note that many photographic societies took an active if not fraternal interest in the roentgen rays in the early days. The Perak Amateur Photographic Society was a good example of such practice.

About eight months later, this item appeared in the *Straits Times* of October 1, 1897. Quote:

## JUBILEE RAYS

Messrs. Yeow Tet Shin and Li Thung of Ipoh have presented a complete apparatus for producing Roentgen X-Rays for use in the Government Hospital at Ipoh in commemoration of the Diamond Jubilee of the Queen, and have received the thanks of the Government for their generous and public-spirited gift.

### 2. *Singapore follows Suit in late 1897*

(a) It would appear that Singapore would not like to be left behind, for a move was made by some public-spirited persons to acquire a roentgen ray apparatus. Oddly enough, this unit was to be installed in the Municipal Office. This was announced in the *Straits Times* of August 23, 1897. Quote:

## ROENTGEN RAYS

A movement is on foot to purchase a Roentgen Rays apparatus as a Queen Reign Memorial, and allow it to be used on necessary occasions by any qualified medical man. The

scheme is Mr. Borgaardt's and Mr. Grigor Taylor's, and the funds required have already been subscribed. The apparatus will be in the charge of the Municipal Health Officer.

(b) The next report of the Straits Times was on January 5, 1898. It supplied a description of an exhibition of X-rays on the newly installed apparatus in the Municipal Office under the charge of Dr. Middleton, the Municipal Health Officer. Quote:

### THE X-RAYS

#### Dr. Middleton's Soiree

Yesterday evening, in the Municipal Office, Dr. Middleton, the Municipal Health Officer, gave an interesting exhibition of the X-rays. There were some forty or fifty guests present, including Sir Lionel Cox, Mr. Justice Leach and Mrs. Leach, the Municipal President, the U.S. Consul-General, and others. A number of articles enclosed in a box were shown through the side of the box by means of the X-rays, and some photographs of sections of the individual guests were afterwards taken. The photographs, of course, could not be developed last night; but when they are developed, Dr. Middleton will have interesting exhibit of the internal construction of the hands of a number of ladies in Singapore. The only defect in last night's exhibition was that the electric light did not seem to be quite so strong as it might be. Refreshments were provided. It may be remembered that the X-rays apparatus was purchased by subscriptions raised among a few gentlemen locally; and that Dr. Middleton was invited to take charge of it, with the intention that he shall place it at the services of any of the recognised medical practitioners when they need it. The fees paid for its use are expected to cover the cost of maintenance.

(c) Human nature, being the same at all times and ages, was no different those days. One marvels at the speed of writing and reporting already evident in those early days. For right the next day following Dr. Middleton's Soiree was found this letter in the Straits Times of January 6, 1898. Quote:

### "X" RAYS

To the Editor of the "Straits Times": Sir,—With reference to the exhibition of the "X" rays, on Tuesday night, at the Municipal Office, it seems a very strange want of courtesy that the subscribers to the purchase of the apparatus have not all been invited to see them.

They certainly were the first people to be asked, and not the personal friends of Dr. Middleton.

I am, &c.,  
Singaporean

6th January

(d) An equally astonishing quick repartee by Dr. Middleton followed in the Straits Times of January 7, 1898. Quote:

### "X" RAYS

To the Editor of the "Straits Times": Sir,—In reply to the letter of "Singaporean" in your issue of yesterday, permit me to state that the exhibition of the "X" Rays, given in the Municipal Office on Tuesday evening, was not one given to the subscribers, many of whom I have not the pleasure of knowing, but a private trial for which the use of the apparatus was obtained on the same terms as those on which it is open to any member of the public to secure.

I am, &c.,  
W.R.C. Middleton

6th January

(e) The following amusing item appeared in the Straits Times of January 8, 1898, and would appear to be directed towards Dr. Middleton, in jest. Quote:

### ON THE VERANDAH

They tell a story about the Guardian of the X-rays and a Lady; but, in narrating the story, I do not guarantee its truth. The story is probably as baseless as the rumours of the "steamship passenger"; yet it carries its moral:

"Now, let me photograph you", said the doctor, at his X-ray seance, on Tuesday night. "But, doctor, not 'the altogether'!" said the Lady.

The deduction is that the Lady had been reading "Trilby". The moral is that it is well that the X-ray apparatus is, in the care of so prudent, so trustworthy, so discreet a person as the Municipal Health Officer is . . . . .

Still, I do not advise that the custodian of the X-rays apparatus shall engage himself in amateur photography. That the Health Officer will be discreet we know; but he must be even more than ordinarily so. The custodian of the X-rays must be like Caesar's wife; else people will untruthfully invent yet other stories such as that I have narrated.

(f) Interest in the use of the new X-ray apparatus was evinced in the following item in the Straits Times of January 12, 1898. Quote:

### THE X-RAYS

The Chinese coolie, who was shot in the back from the *s.s. Dante*, has been examined in hospital by means of the X-rays. The rays worked well, enabling the doctors to see right through the coolie's body; but the bullet was not found. It is believed to have splintered against the man's backbone, and to have become absorbed in fragments in his body. The man will recover.

(g) Towards the end of 1898, an inexplicable and unusual burst of activity of the local medical profession occurred, when a series of seven "Health Lectures" was arranged. This was unprecedented in the history of Singapore. One might be tempted to conjecture that the coming of the X-rays to Singapore in 1898 had stimulated the local medical world into activity. Our interest here would be centred on the lecture on "The Roentgen Rays" by Dr. Middleton. This was what the Straits Times of October 24, 1898 had to say in its editorial. Quote:

### HEALTH LECTURES

Singapore is not too well provided with intellectual entertainment, a fact that is much more due to the want of initiative on some one's part than to distaste among the many. The spell is about to be broken; individual energy has secured the needed co-operation and seems to secure us a somewhat novel and exceedingly useful course of address during the next few months. Health lectures by our leading medical men are to be given on alternate Monday evenings, with a break at the New Year, beginning on November 7th. Seven well-varied subjects are announced for popular treatment, illustrated (when practicable) by magic lantern demonstrations and by experiments. The lectures are to be given at the Tanglin Club, the sympathies of the Committee with the promoters of these lectures being, we hope, an indication of the general support that will be forthcoming from the community . . . The price of the tickets is only just sufficient to cover unavoidable expenses—two dollars for the whole course, a very cheap education, or fifty cents a lecture (obtainable from Messrs. Little & Co.). The following is the full syllabus:—

November 7—"Contagion and its Prevention"—Dr. Simon

November 21—"The Roentgen Rays"—Dr. Middleton

December 5—"Water"—Dr. Ellis

December 19—"Diet and Exercise in the Tropics"—Dr. Fowlie

January 9—"Digestion"—Dr. Lim Boon Keng

January 23—"The Care of Children in Tropics"—Dr. Galloway

February 6—"The Influence of Dress on Health"—Dr. Glennie

(i) All the lectures were well announced beforehand and reported in detail in the Straits Times. This announcement of Dr. Middleton's talk appeared on November 19, 1898. Quote:

### TANGLIN HEALTH LECTURE

The second of the series of health lectures at the Tanglin Club will be given on Monday evening nine o'clock when Dr. Middleton will speak upon "The Roentgen Rays". Mr. W. Grigor Taylor will occupy the chair. The tickets for the remaining six lectures of the course are to be had from Messrs. John Little & Co. for \$2, or a ticket for a single lecture can be obtained for 50 cents. It is proposed to divide any surplus funds from the sale of tickets, after necessary expenses in connection with the lecture have been paid, towards the purchase of new batteries for the Roentgen Rays apparatus.

(j) The lecture given by Dr. Middleton was delivered on November 21, 1898 and was reported in detail by the Straits Times the following day. Quote:

### THE ROENTGEN RAYS

The second of the series of seven popular lectures . . . was delivered by Dr. Middleton last night . . . it attracted a large assembly of both ladies and gentlemen, curious to learn something of these powerful but still mysterious beams and of the method of their production. What was expected, moreover, in the way of practical demonstration it would be hard to say, but most assuredly the spectacular side of the subject exerted a very strong influence as well as the literary.

Mr. Grigor Taylor, on taking the chair, said the lecture about to be given was somewhat of a different character from the one that had already been given and from those that were to come. Strictly speaking, perhaps, the Roent-



gen Rays could not be classed under the head of health lectures, yet the subject was a most interesting one and was worthy of their attention. It had been decided, to devote the proceeds of the lectures towards buying new Roentgen Rays apparatus, which, in the custody of the Municipality, would be the property of Singapore. Strange to say, although the Roentgen Rays were of the utmost use with surgery, the Singapore Hospital was one of the few hospitals of its class which did not possess the necessary apparatus.

Dr. Middleton then proceeded to deliver his lecture. The earlier part was devoted to a detailed description of the Roentgen Ray apparatus . . . Turning to what had been accomplished by the rays and the uses to which they had been put, the Doctor said that their most important application, of course, had been in the realms of medicine and surgery. The rays had not only made the diagnosis of obscure injuries and ailments more easy, but they had saved patients a vast deal of suffering which in former days they would necessarily have been subjected to. The rays had been used to demonstrate fractures of bones and dislocations of joints, and as they passed easily through wood, it was unnecessary to disturb any splints of that material which might already have been applied. They had been used to demonstrate diseases of bones, and rheumatic deposits in joints; also the presence of foreign bodies such as pins, needles, bullets, glasses, or splinters of iron in arms, legs, bodies, eyes, and even in the brain. They promised to be of great use dentistry . . . The living heart had been photographed, as also had been more solid abdominal organs . . . In military surgery the rays had proved of the greatest service. They had been employed in the late frontier campaigns in India and in the Soudan, and it was safe to say that the X-ray apparatus would form part of the Royal Army Medical Corps on active service in future . . . Illicit inclosures of coins and articles of value could be detected; in this respect, however, the utility of the rays was somewhat limited as some contraband articles, such as lace and tobacco, were transparent to the rays. In distinguishing between real and imitation gems the rays were also useful; real gems were transparent while imitations were more or less opaque. On the whole, the rays had opened up possibility which, until their discovery had never been dreamed of. For what they might reveal in the future or for what other rays still undiscovered might reveal they

must wait until the labours of the many workers now investigating the subject were rewarded with success.

The Doctor then illustrated his lecture by a few practical tests of the Roentgen Ray apparatus. The lights were turned out and various articles such as leather portmanteau, a book and a wooden box containing coins, and other non-penetrating substances were held behind the fluorescent screen, when the latter articles become visible by means of the X-rays . . . Various members of the audience were allowed to place their hands behind the screen, where the bones could be plainly seen. Other tests closed a most interesting of one of science's latest marvels.

(k) The next communication on X-rays appeared in the Straits Times of September 27, 1899. Quote:

#### "X" RAYS IN SINGAPORE

Last night, at the office of the Cable Company, the members of the medical profession and a few others were present at an exhibition and lecture demonstration with the Roentgen Rays. The intention was to let members of the medical profession have an opportunity of familiarising themselves with the technical details of managing electric light. The proceedings, we understand, were both instructive and interesting.

#### 3. Canton

To end up this section, the following amusing item appeared in the Straits Times of December 13, 1900. Quote:

#### X-RAYS AT CANTON

About a year ago a wealthy Chinese gentleman, whose family had been greatly benefited by treatment at the Canton Hospital, showed his gratitude by ordering a static machine for the exhibition of X-rays. The outfit cost about \$800. The machine arrived in due time and hundreds of Chinese have visited the hospital to see the wonders revealed by the X-rays. It is said to be most amusing to listen to the remarks of the Chinese after they have looked through plank several inches thick and had recognised a key on the opposite side, or after seeing the bones of the body clearly revealed. One man seemed to express the sentiments of the crowd when he said: "There is nothing hid from these foreigners."

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## REFERENCES

1. Glasser, Otto: "Dr. W.C. Röntgen." 2nd Edition. Thomas, Springfield, 1958.
  2. Dewing, S.B.: "Modern Radiology in Historical Perspective." Thomas, Springfield, 1962.
  3. Etter, L.E: "The Science of Ionizing Radiation. Modes of Application." Thomas, Springfield, 1965.
  4. White, H.E: "Introduction to Atomic and Nuclear Physics." Van Nostrand, Princeton, 1964.
  5. Jeans, J.: "The Growth of Physical Science." Fawcett Publications, Greenwich, 1961.
  6. Williams, T.L., Editor: "A Biographical Dictionary of Scientists." Black, London, 1969.
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