

Uwe Busch

# Anna, Phillip and the Life of Mr. Röntgen

illustrated  
by Oliver Wolff

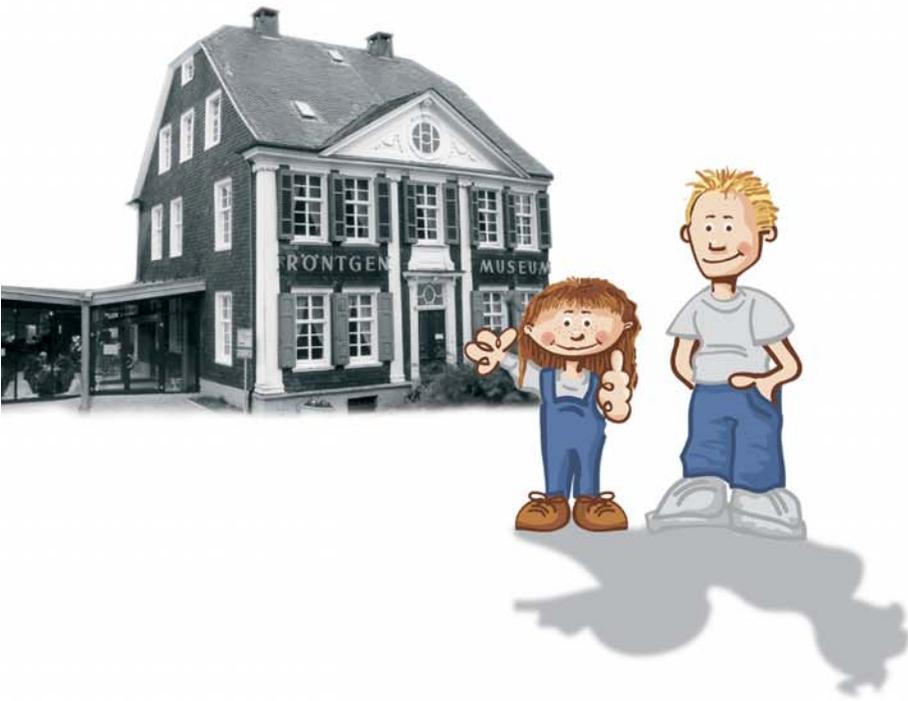


The life and work  
of the man who  
discovered X-rays,  
told by himself



Werkstatt Röntgen  
für Kids e.V.





Hello Kids!

Our names are Anna and Phillip, and we are interested in everything that has anything to do with X-rays and the man who discovered them, Professor Wilhelm Conrad Röntgen.

Today we want to find out something about Professor Röntgen's life so we've come to the German Röntgen Museum in Remscheid. And who have we met but the ghost of Professor Röntgen himself!

"Phillip, what else do you know about Wilhelm Conrad Röntgen? What kind of a man was he, and how did he come to discover X-rays?"

"I'm afraid I don't know all that much either, Anna. But perhaps Mr. Röntgen's ghost will be willing to tell us a bit more about himself and his discovery."

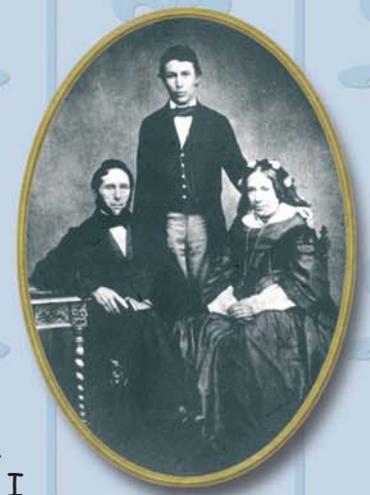
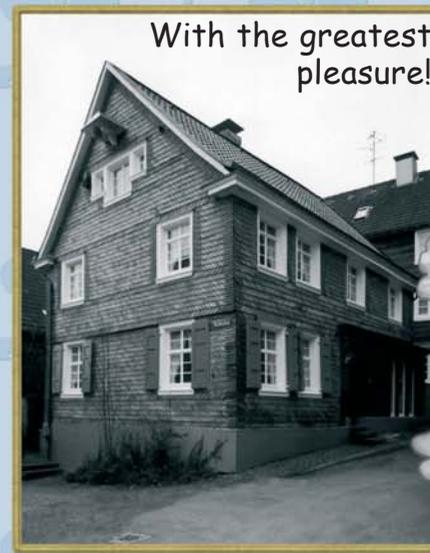
Anna, Phillip und das Leben des Herrn Röntgen

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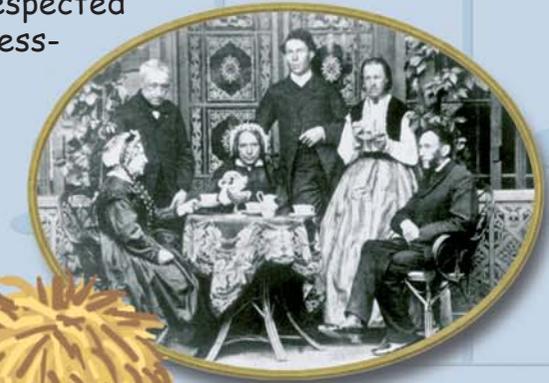
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Now  
where  
should I  
begin?

Well, I was born on March 27, 1845 in Lennep, in the part of Germany known as the Bergisches Land. My father, Friedrich Conrad Röntgen, was a well-respected cloth manufacturer and businessman. My mother, Charlotte Constanze, was born in Amsterdam. In fact, her family also came originally from the Bergisches Land. Here is a picture of the house where I was born and some more pictures of my parents and relatives.





When I was three, my father moved with the whole family to Holland where my grandmother and grandfather were living in Apeldoorn.

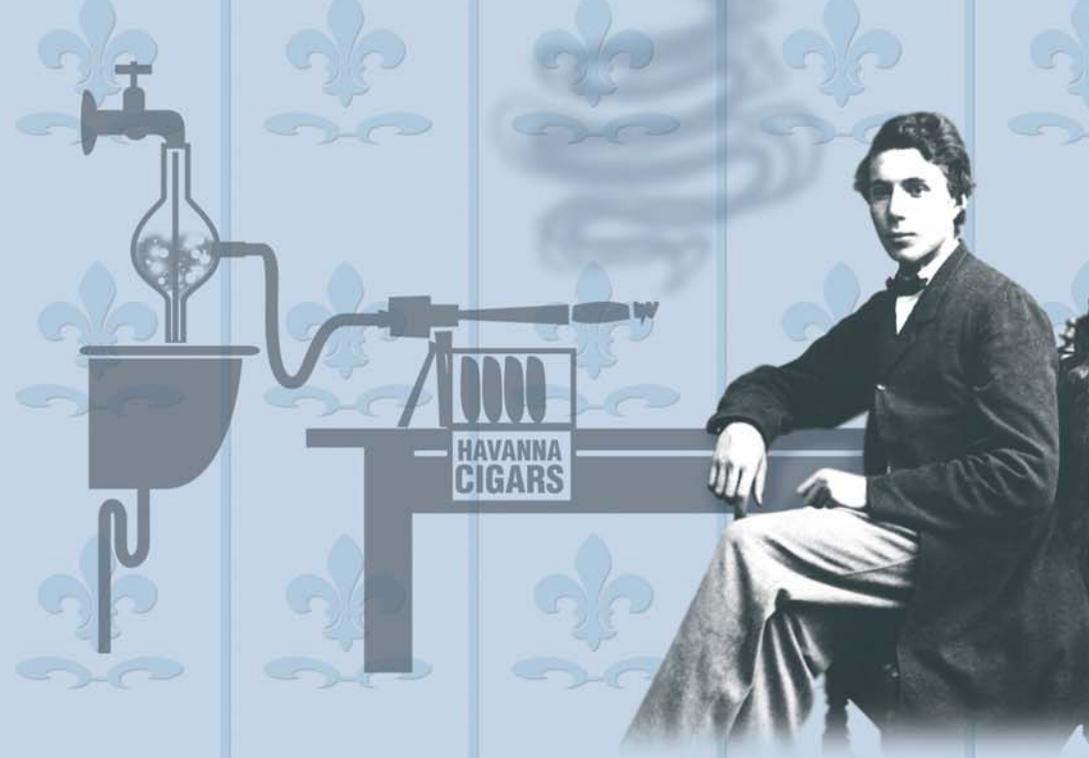
As to my school days, I'm afraid my memories aren't all that happy.

One morning I came into the classroom and saw that one of my school mates had drawn a very good caricature of our teacher on the fire screen. I found it very funny, but unfortunately I failed to notice that the teacher had come into the room.



He naturally thought that it was I who had drawn the picture.

He was so angry, that I ended up being expelled from school!



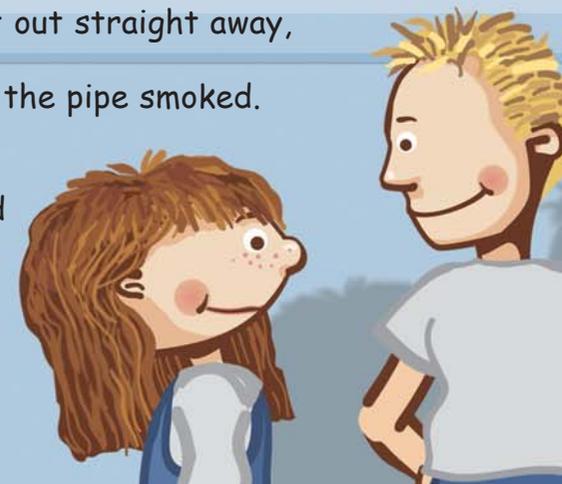
This came as a great shock to me, because I had always wanted to attend university and study there. Even as boy, I was already highly interested in mechanical things.

Did you know that I once invented a pipe and cigar smoking machine? Well no, you wouldn't! But it came about like this.

My uncle once brought me a wonderful meerschaum pipe - meerschaum is a kind of soft stone from China. I naturally wanted to try out it out straight away, but my parents forbade me to. Even so, I wanted to know how the pipe smoked. So I invented a machine.

And believe it or not, it worked perfectly! My pipe was smoked empty in next to no time.

It also allowed cigars to be smoked a lot more quickly than they normally could.





I really enjoyed inventing things, so I thought it would be a good idea to study a technical subject.

I had learned through a friend of my father that it was possible to study at the Polytechnic in Zurich, Switzerland, even if you did not have a school-leaving certificate.



It was necessary to take an entrance exam, which was extremely difficult.

However, I passed the exam and so was able to start studying mechanical engineering on November 14, 1865.

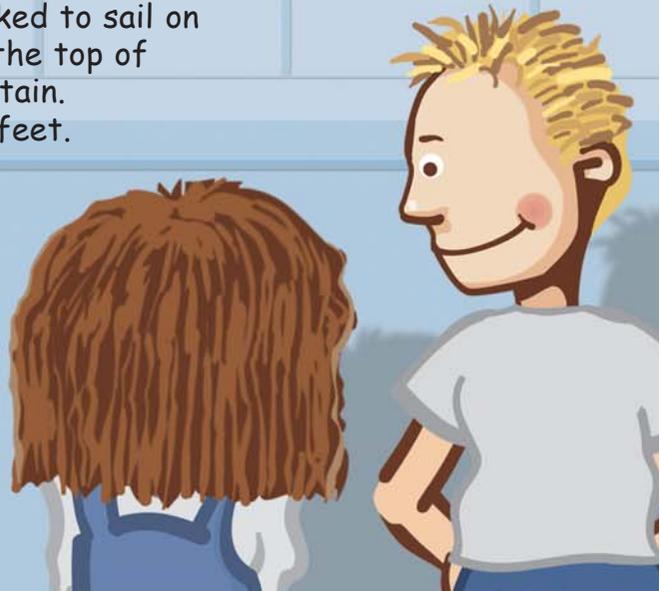


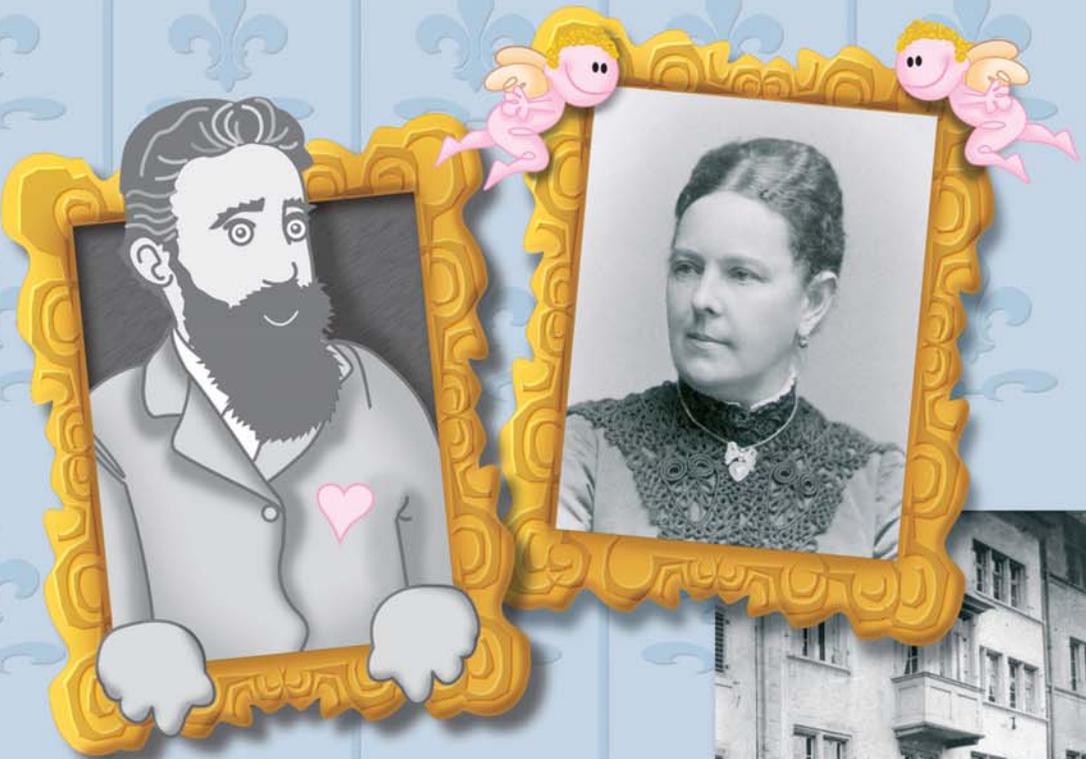
Zurich was a lovely place.

Apart from studying, which I thoroughly enjoyed, I also liked to sail on Lake Zurich and walk to the top of Uetliberg, a nearby mountain. It had a height of 2850 feet.

The view from there was simply fantastic.

I loved the mountains, and later on in life spent nearly all my holidays in the Swiss mountains around Pontressina.





Zurich is also where I met my wife. I often went with my friends to an inn called the "Zum grünen Glas" (the "Green Glass").

The owner of this inn had a perfect knowledge of ancient Greek and Latin and often helped us in writing our homework assignments. He also gave us fencing lessons. So I was a frequent visitor. Mr. Ludwig - that was his name - had three daughters, one of whom was called Anna Bertha.

We took a liking to each other straight away, and got married in January of 1872.

Initially my parents were not very happy about this. My father would have liked me to marry a daughter from a wealthy family.

But for me, it was either Anna Bertha, or nobody!

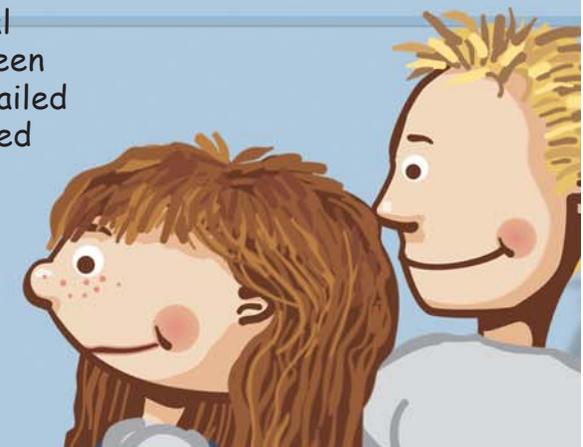
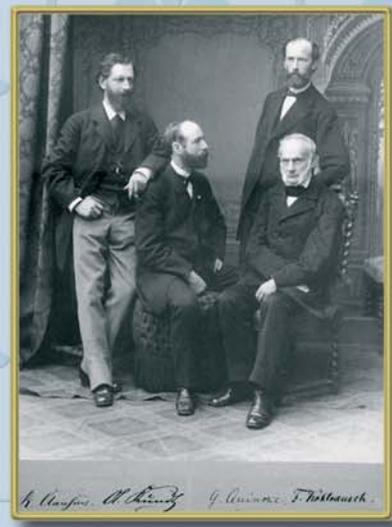


When attending Polytechnic Zurich, I discovered the world of physics by a fortunate coincidence. After taking my first degree in mechanical engineering, I went on to obtain a degree, and wrote my thesis on gases.

Now at this time I did not really feel like going into a profession as a mechanical engineer.

However, purely by chance, I happened to make the acquaintance of Professor August Kundt who was a great and already famous physicist. He asked me whether I would like to work as his assistant.

At first I was rather sceptical because at school I had not been very keen on physics. I even failed it once! Nevertheless, I decided to give it a try and it proved to be the best decision of my life.





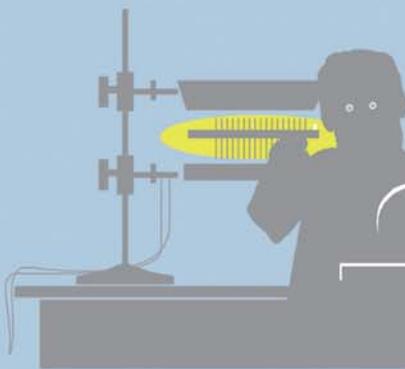
When I was an assistant, there were a lot of interesting and exciting things to explore in physics.

For instance, Professor Kundt and I worked on improving the accuracy of the measuring instruments which existed at the time.

In fact, I developed a very special relationship towards my measuring instruments.

I always looked after them very carefully, and it used to make me absolutely furious if anyone treated my instruments carelessly.

I once said: "Anybody who treats my instruments badly is my enemy!"



As well as that, I was extremely interested in investigating the physical properties of water and steam.

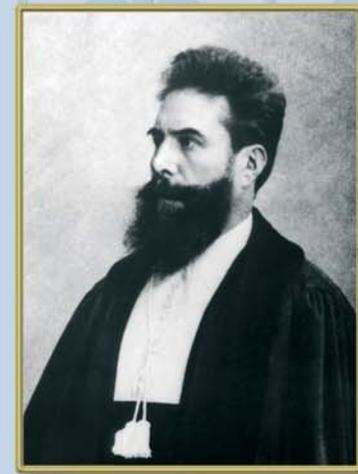
Another thing that fascinated me were crystals. There are some crystals that, if compressed, generate electricity. I'll bet you didn't know that!

One experiment I particularly enjoyed was creating sounds in gases by exposing them to radiation. By analysing the sounds, it is possible to precisely define the composition of the gases.

Through another experiment, I was able to contribute towards proving James Clark Maxwell's theory on electricity and magnetism, which is still very important today.

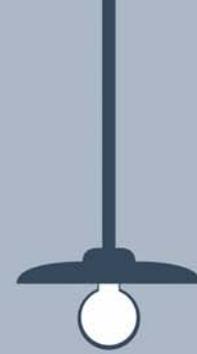
My work was submitted to the Prussian Academy of Sciences, and the effect I found was named the "Röntgen current".

That was a great honour for me.





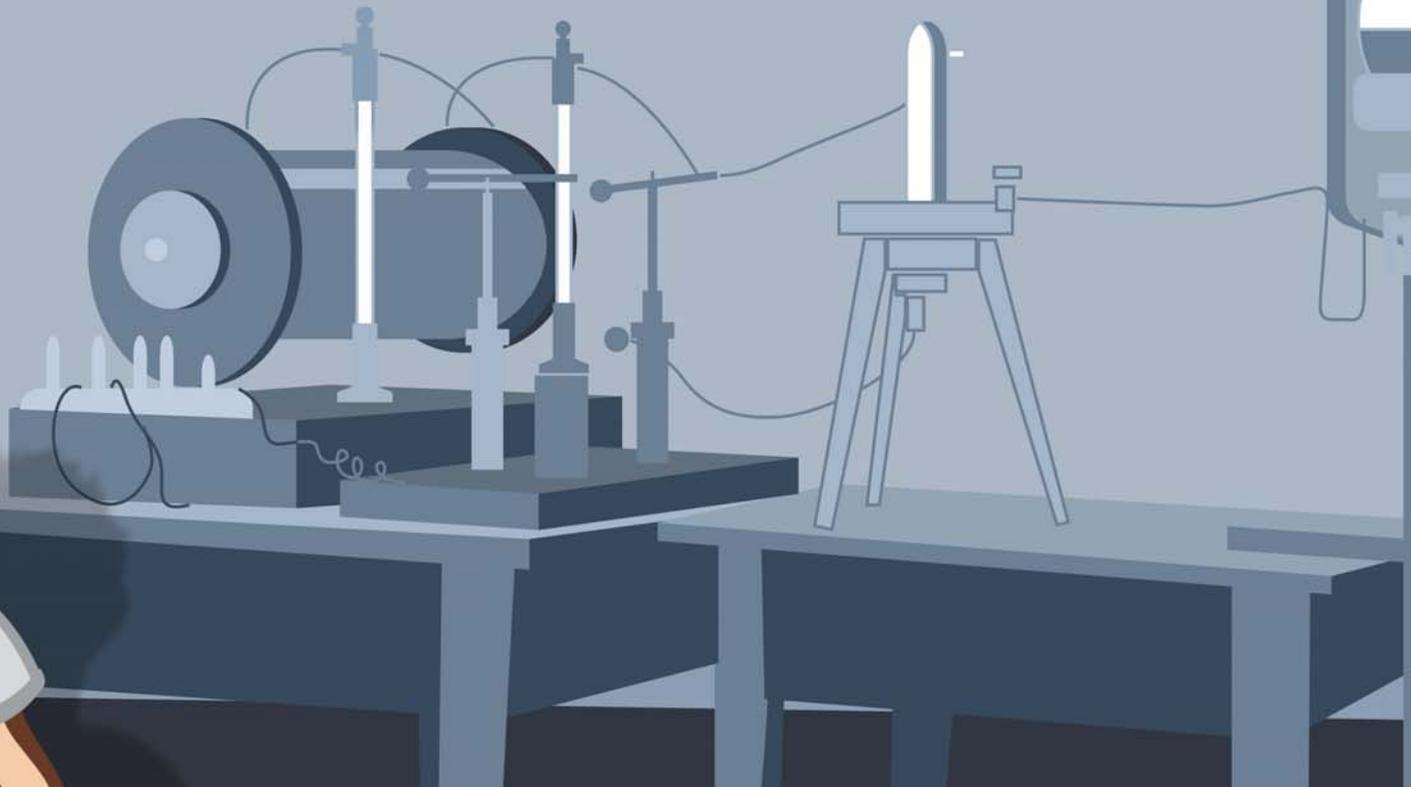
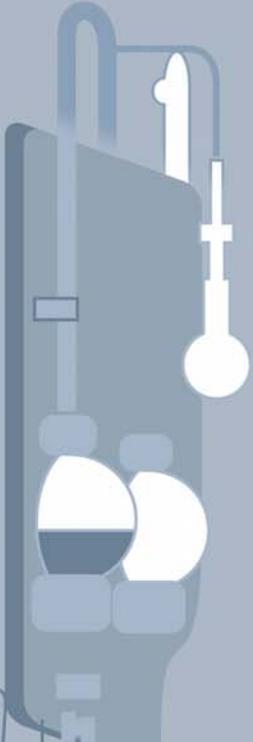
"So how did the discovery of X-rays actually come about?"



On November 8, 1895, working in my laboratory at Würzburg University, I started studying luminous phenomena in gases at reduced pressures. Physicists had already been looking for some time for an explanation as to the causes of these electrical discharges. So I decided to investigate this phenomenon for myself. I obtained a high tension

device, a so-called induction coil, a glass tube - at that time we called them ion tubes - and a vacuum pump.

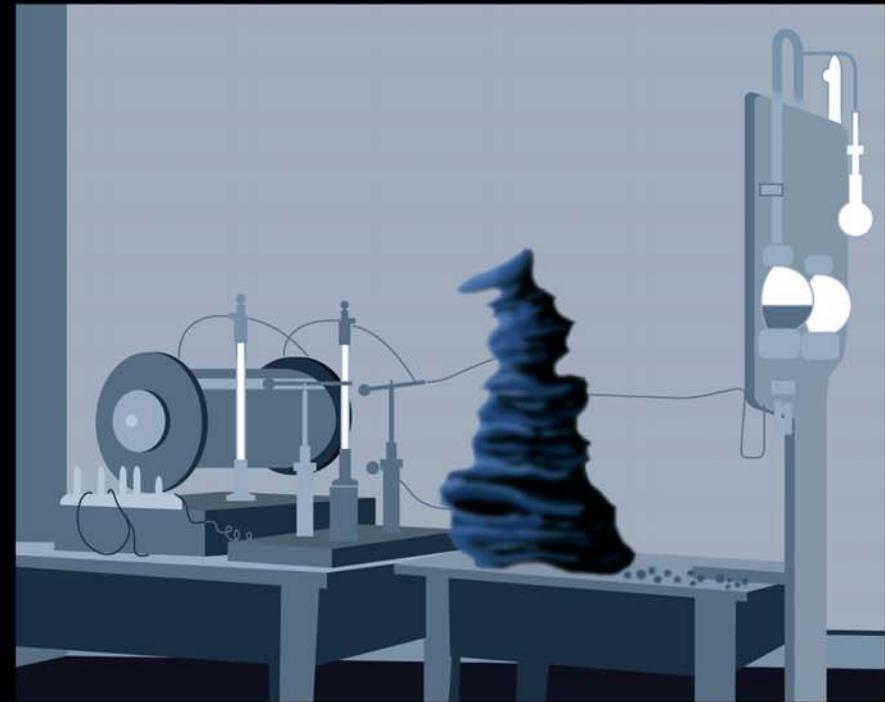
If the air in the glass tube was partially evacuated with a vacuum pump and a high tension of around 60,000 volts was applied to two metal electrodes in the tube, the tubes started to give off a blue light which could be seen if the room was in darkness. What we physicists wanted to know was what caused this blue light.



During the experiment I just happened to see that a number of luminous crystals (that were lying on the bench near the tube) had also started to give off light.

This is a phenomenon known as fluorescence. You are probably familiar with crystals of this kind from your alarm clock or your wristwatch. Even in the dark, you can still see what time it is because of the fluorescent numbers on the dial. At any rate, now I was really interested. I wanted to know exactly what it was that caused these crystals to fluoresce. The answer seemed simple. It appeared obvious that the crystals could only have been excited by the blue light in the tube, because the room was otherwise in complete darkness.

If the fluorescence of the crystals was in fact caused by the blue light, this was easy to prove. To prove my theory, I covered the tube with thick black paper so that no more light could shine through. And indeed, it couldn't. The tubes were working, even though the room was completely black. I could not even see my hand in front of my eyes.

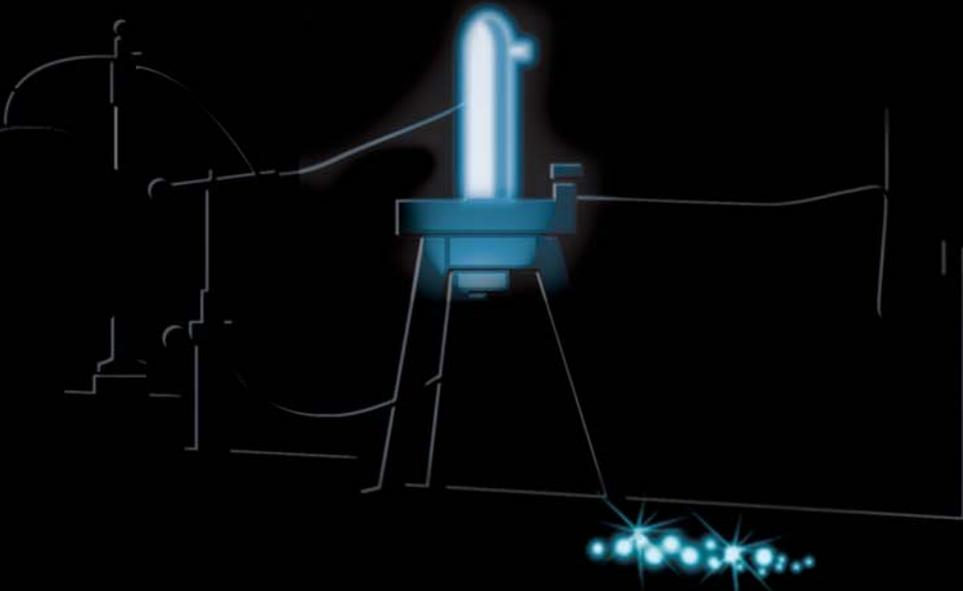


So if my thinking was correct, the crystals should not be giving off any more light, but in fact, they were!

I was completely dumbfounded. According to physical theory, this was impossible. Where there was no light, there could be no fluorescence!

So, I wondered what should I do. I picked up the crystals and took them to the furthest corner of my laboratory. They were still fluorescing. I went back, and the closer the crystals came to the tube, the more brightly they shone.

This effect must have had something to do with the tube. I also discovered that the crystals only stopped fluorescing when I turned off the electricity to the tube.





The only way to explain this phenomenon was to bring a completely new idea into play.

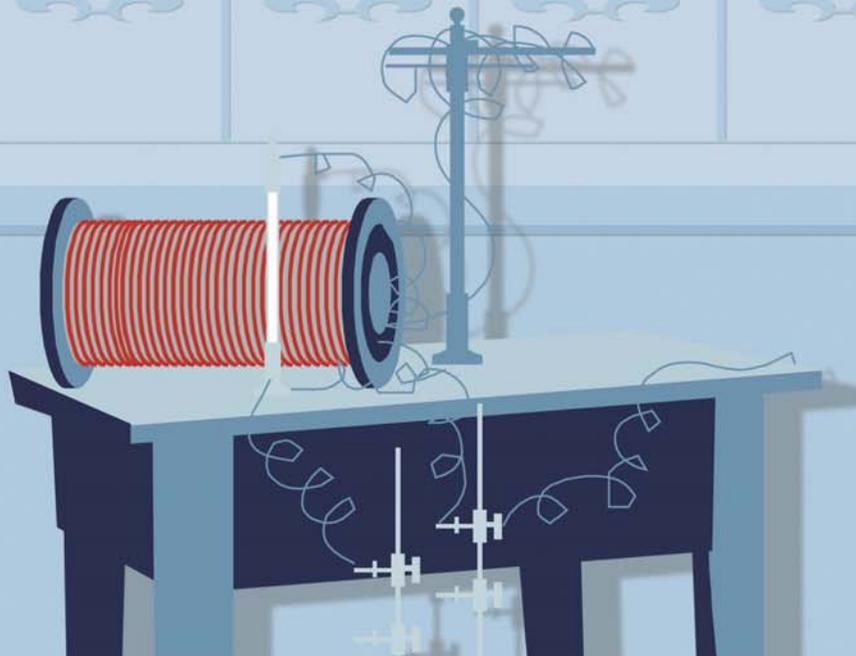
What if the crystals were being made to fluoresce by a kind of light yet unknown?

A kind of light that could pass unhindered through the black paper and was also invisible. X-light, so to speak!

It sounded crazy, but as far as I could see, it was the only

possible explanation. I locked myself in my laboratory and worked day and night.

And in doing so, I discovered that with the help of X-rays, it was possible to render hidden things visible.



I took photos of sets of weights in a wooden box and also of a compass in its box. I even tried to take a photo through my laboratory door.

However, that didn't work, because the door was painted with lead paint and my X-rays could not penetrate it.

So that is also the way, I discovered that lead is the best thing for stopping the rays.



Then purely by chance,  
I held my hand between the  
tube and a screen coated  
with fluorescent crystals.

That gave me a shock,  
because I could actually  
see the bones in my hand!

On December 22, 1895,  
I asked my wife Anna Bertha  
to come into my laboratory.

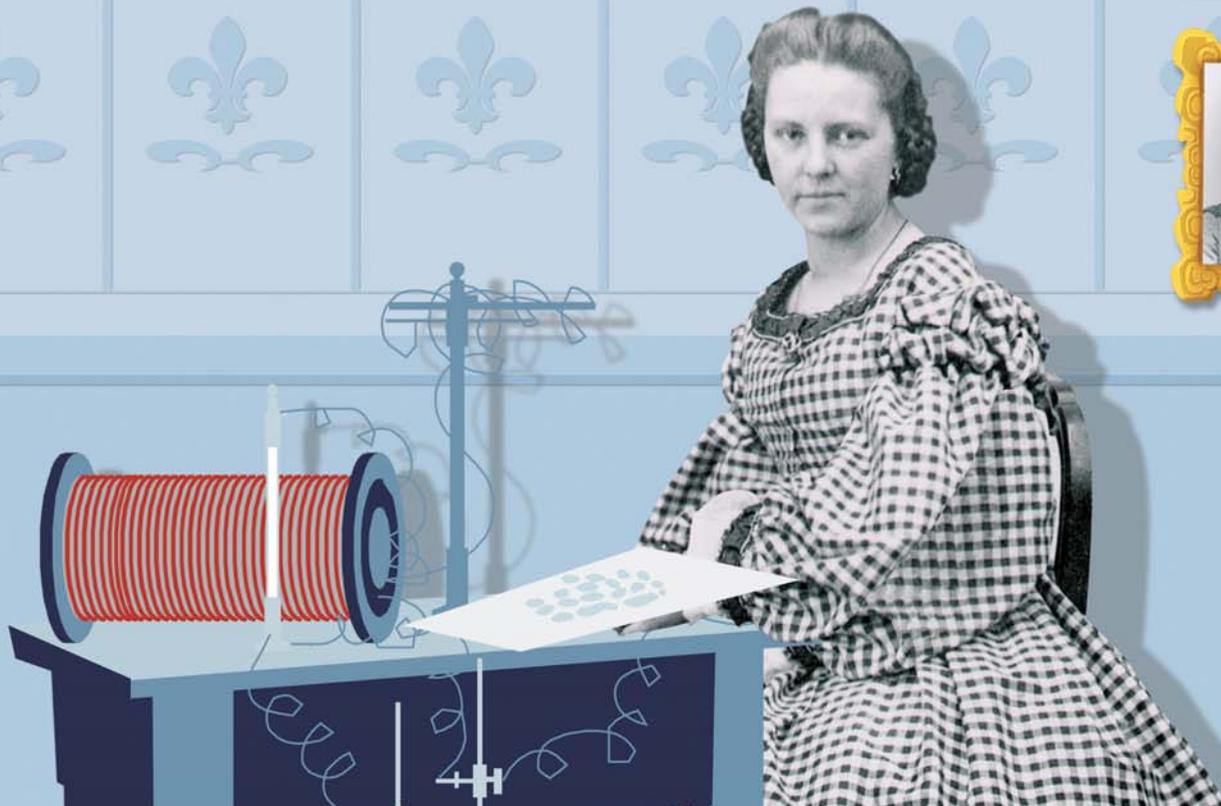


She held her hand on a  
photographic plate, and I  
took a wonderful picture  
of her hand using X-rays.

You can see the picture  
here.

I don't think my wife was  
quite so thrilled.

She found it a bit too  
creepy.





At any rate, I wrote up my research results and sent them to the printers on December 28, 1895. At the start of the new year, in 1896, I received the first offprints and together with nine pictures, immediately sent them off to my colleagues. Some were rather astonished when they saw the pictures.

On January 5, 1896, the first reports of my discovery appeared in newspapers in Berlin and Vienna.

It was then my turn to be surprised! In the coming weeks, I received bagfuls of mail nearly every day. The people wanted to know simply everything. How do you make X-rays? Where can you get X-ray pictures? And so on, and so on. I have to admit that I burnt a lot of the letters without even bothering to read them and only kept a few.

Some of the letters were highly amusing.

One man informed me that he had a bullet stuck in his chest but regretted that he didn't have the time to come and see me. So could I please send him a few X-rays and explain to him how to use them?

I sent him the following reply: "Dear Sir! I regret that I currently do not have any X-rays in stock. Moreover, it is very difficult to send these rays by post. I therefore propose a simpler method as follows: Please send me your chest instead."

I'm afraid I never heard from him again.





I gave two lectures on my X-rays.



On January 13, 1896, I was invited by the German Emperor, Wilhelm II, to visit him in his palace in Potsdam and tell him about my discovery.

It was very thrilling, and the Emperor also gave me a medal.



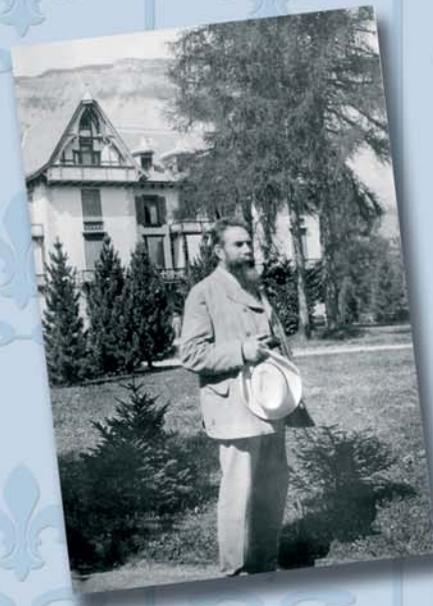
The second lecture was in Würzburg. To demonstrate how to take the X-ray picture, I asked my friend, the highly esteemed Professor Albrecht von Kölliker, if I could use his hand.

The exposure time of the picture took 40 minutes. Then my assistant developed it, and I presented it to Professor von Kölliker, a doctor who was a specialist in anatomy. As soon as he saw the bones of his own hand, he realised all the ways X-rays could be used in medicine.

He was so excited, he proclaimed that in future the new X-rays should be called "Röntgen rays" in my honour.

Everyone agreed and applauded. I was very touched.

And of course in Germany, X-rays are still called "Röntgen rays" today.



After all this excitement, I wanted to get away for a while.

I thought a short holiday would do me good.

I had a nice country home in Weilheim, so I drove out there, and went shooting with my dog.

Simply being outdoors in the countryside was always one of my greatest pleasures.

I also liked taking long walks.

And I very much enjoyed spending time with my friends.





I received a lot of awards and distinctions during my life.

After a while I stopped counting. Among some of my awards, I was offered the Bavarian Crown Order, Second Class.

That is a special honour that bestows noble rank on the holder, and allows you to put "von" in front of your name. However, I did not wish to be called "von Röntgen," so I refused. I also strictly refused all offers to patent my discovery and earn money with it. It was my firm opinion that my discovery should be available to everybody.



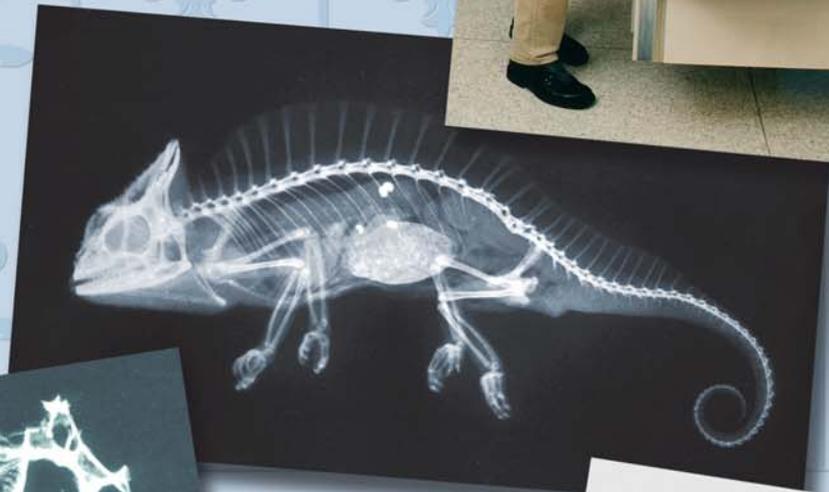
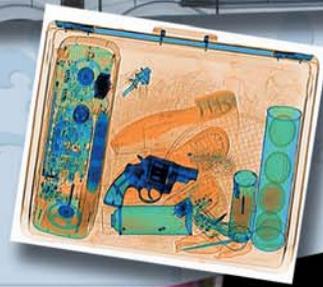
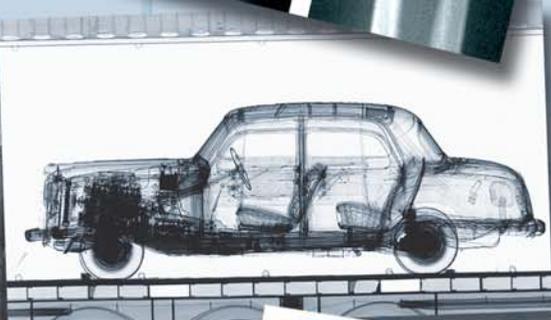
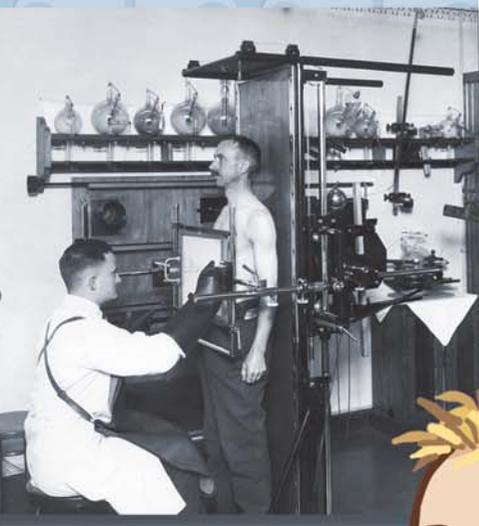
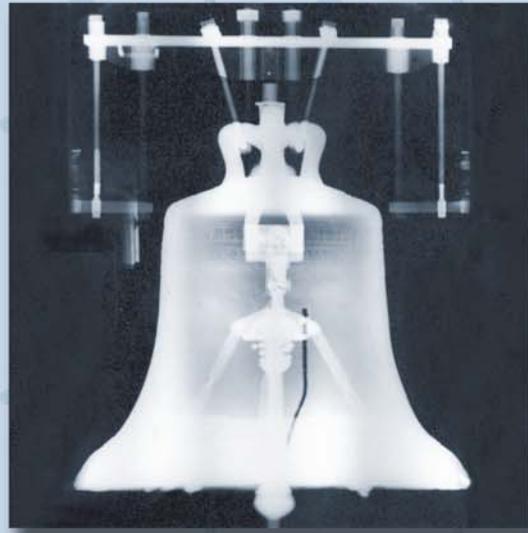
One distinction I received, however, was very important for me.

This was the Nobel Prize. I was awarded the very first Nobel Prize for Physics in 1901.

This picture shows me in Stockholm, where I received the prize on December 10, 1901 from the king of Sweden.

I donated the money that went with the prize to Würzburg University to be used for grants and scholarships for students and young scientists.

It has been quite surprising to see how many applications have been found for my X-rays. The doctors were the first people to make use of my discovery. Today, though, they are not only used in nearly all areas of science and research, but also in everyday life. I think there's probably not a thing in the world that hasn't been X-rayed at one time or another. These are just a few examples.





**My Family**  
I've already told you a little about my wife. We lived a very happy life together.

Unfortunately she was often ill and I had to look after her.

Anna Bertha also died four years before me, on October 31, 1919.

The worst thing for us was that we couldn't have any children of our own. We therefore decided to adopt Josephina, my wife's niece.

#### My Hobbies

Apart from my love of the countryside and hunting, I always enjoyed making small mechanical devices. I've already told you about my smoking machine. And talking of smoking: I was a passionate smoker. I had a lot of pipes, and the the ones I liked best were the cheap clay pipes that I smoked with strong Dutch tobacco. After a lot of use, I'd throw them in the fire to burn out and then pick them up and smoke them again.

I was also a great reader. I had quite a big library with about 10,000 books. They weren't all physics books either. I also liked reading travel books, books of letters by famous people, and memoirs and autobiographies. I especially enjoyed the short stories of Jeremias Gotthelf. I also loved music, especially Beethoven and Mozart.

#### Anna's Poetry Album

Name: Wilhelm Conrad Röntgen  
Date of birth: 27th March 1845  
Place of birth: Lennep, Rhineland  
Birth sign: Aries  
Hair colour: Dark brown  
Eye colour: Blue-grey  
Height: 1.86 m  
Weight: approx. 80 kg

My favourite food: Venison  
My favourite drink: Franconian wine  
My favourite book: Popular Lectures by Helmholtz  
My favourite music: Beethoven, Sonata No. 110  
My favourite subject: Geometry  
Things I find cool: Awards  
Things I love: My wife, my work, and the countryside  
Things I hate: Spiders

I died in Munich on 10th February 1923 after a short illness.

I was buried in the old cemetery in Giessen, where the graves of my parents and my wife can also be found.



"Anna, Phillip and the Life of Mr. Röntgen"  
a brochure for children and young people

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A lot of other interesting information can be found on the website  
at [www.werkstatt-roentgen.de](http://www.werkstatt-roentgen.de)

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