

The Encyclopedia of Science Kiiminki Senior High School Edition 2015 Vol. 1

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The purpose of this Encyclopedia of Science is to increase people's interest in popular science. The contributors were asked to provide an entry on a scientist, an invention of note or a scientific phenomenon.

The budding science writers comprising the team of (in)experts in the current edition of The Encyclopedia were reminded of the nature of scientific writing: striving for objectivity and clarity, acknowledging and listing the sources used as well as generally having a good time in the process. After all, learning by doing being The Thang to facilitate deeper understanding of the subject matter, what could be a better opportunity to enlighten the world with the new-found wisdom below than making an electronic Encyclopedia of Science? Enjoy! 😊

Edited by Maxx Perälä

NB The language used in the articles is not edited.

Nuclear weapons

Nuclear weapons are explosive devices which draw their power from fission reactions and fusion reactions. From both of these reactions, a massive amount of energy will be released. This is possible with a small portion of matter, even though nuclear bombs weigh more than 1100 kg, even a traditional bomb sized nuclear device could destroy a city with blast, fire and radiation caused by it. Nuclear weapons are weapons of mass destruction and their use and control has been a major focus internationally.

Nuclear weapons can be divided in to two main groups, fission weapons and thermonuclear weapons, also known as, fusion weapons.

Fission weapons, as their name suggests, draw their power from fission reaction of the nucleus of the atom. In a fission reaction the core of an atoms splits in half, while releasing energy. Fissile material used in these bombs is enriched uranium or plutonium, which is compressed into a critical mass and then detonated to start an exponentially growing chain reaction of core-splitting. The fissile material can be detonated in two ways. Either shooting a small piece of sub-critical material into another (the "gun" method), or by compressing the sub-critical mass to many times it original density, using explosive lenses and chemical explosives (the "implosion" method). Implosion method is considered more complex, but is the only option while using plutonium as the fissile material. All fission reactions cause fission products. Radioactive remains of the splitting reaction of atoms. These products are radioactive and are a serious form of radioactive contamination, if not secured properly.

Fusion weapons are the other basic type of nuclear weapons. These thermonuclear bombs, or hydrogen bombs, rely on fusion reactions between isotopes of hydrogen. But still these weapons do draw some of their energy from fission reactions as they need it as a trigger to the

fusion reactions, which again can cause fission reactions on their own. Thermonuclear bombs work by using energy from the fission reaction to heat and compress fusion fuel. As the fission detonator is set off, gamma rays and x-rays, first compress the fusion fuel and then heat it to thermonuclear temperatures. The following fusion reaction creates enormous numbers of high-speed neutrons, which then cause fission reactions. These components are called "stages", the fission detonator being the "primary" and the fusion capsule the "secondary". Fusion reaction in itself doesn't cause fission products, but because all thermonuclear weapons have at least one fission stage, even as much fission product is created as in a fission-only weapon.

Only two nuclear weapons have been used in combat, these are the bombs of Hiroshima and Nagasaki. Both dropped by United States in to the Japanese cities. In Hiroshima killing around 80,000 people, and 40,000 in Nagasaki. Somewhere around 100,000 people died later due to radiation poisoning.

Since 1942, over 100,000 scientists had worked for the development of the weapon. It was the biggest scientific effort ever undertaken, at the time. Scientists first worked in isolation, away from each other, unaware of the real magnitude of the project. Later, the project was gathered and centralized in a one laboratory in Los Alamos, New Mexico. First trial of the weapon was carried out on 16th of July 1945.

Ville Eskola

Steve Jobs

-One of the fathers of modern technology

Steven Paul "Steve" Jobs was one of the founders of IT company Apple in 1976. He was born on 24 February 1955 in San Francisco and died on 5 October 2011 in Palo Alto, California. After founding of Apple he instituted another one IT company called NeXT and animation studio Pixar. Jobs was married with Laurene Powell when he died. Jobs have 4 children. 3 of them are with Laurene and the other one is with Chris-Ann Brenna. Jobs was a Jew.

Jobs' natural parents were mother Joanne Carole Schieble and father Abdulfattah Jandali. Steve was given to adoption because of Schieble's parents. They didn't allow Schieble to get married with Jandali because Jandali was a Syrian. Adoptive parents were Paul and Clara Jobs. Steve didn't ever meet his biological father.

Jobs studied in Reed's University for the year in 1972. In 1974 Jobs worked in a firm called Atari where he was a game designer. After collecting the money for months he went on the trip to India.

In 1976 Steve Jobs founded Apple together with Steve Wozniak. Apple released the first computer for home use the one year later. Already in 1980 Jobs' property was over 200 million dollars. Apple released the Apple Lisa in 1983 and the Apple Macintosh in 1984. The success of both of them was crappy. In 1983 John Sculley became Apple's new managing director and in 1985 he fired Steve Jobs. Jobs said it was the best thing that could happen then.

The next, Steve Jobs instituted IT company NeXT in 1985. September 22th 1985 Steve Jobs was sued to court by Apple because Steve knew too much about Apple's technology and he could use it to advantage. Problem solved without litigation in 1986 when Steve Jobs promised not to hire anyone Apple's employees for half a year and not to produce computer better than Macintosh.

In 1986 Jobs bought a new company for the price of 5 million dollars. He named it Pixar and invested the other 5 million dollars for the company. Pixar was the first one who released a full length film which was made completely by computer. The name of the movie is Toy Store.

Steve Jobs moved back to Apple in 1996. This time he was the advisor. It wasn't long time until Jobs returned back to the Apple's lead. In 1998 Apple published a new computer iMac which sold very well and fast. In 1997 introduced Apple Store and Power

Macintosh G3 computer which become so popular. In 2001 published music player called iPod. In 2003 Apple brought out new online store iTunes Music Store. In 2007 published the first smartphone iPhone. In 2010 Apple launched the first tablet iPad.

In October 2003 Jobs was diagnosed with the pancreatic cancer. Jobs didn't believe in medicine so at first he didn't consent to surgery. Jobs took care of cancer by other ways which wasn't belong to medicine. However 31 July 2004 the tumor was cut. In 2009 Jobs underwent a liver transplant. In August 2011 Jobs resigned from Apple. When he announced his resignation he said that "I have always said if there ever came a day when I could no longer meet my duties and expectations as Apple's CEO, I would be the first to let you know. Unfortunately, that day has come". 6 weeks later, October 5th 2011 he died in Palo Alto when

his breath stopped because of metastases. October 7th he was buried in the Santa Clara's graveyard for the nonmembers.

Henna Huovinen

Lähteet:

http://fi.wikipedia.org/wiki/Steve_Jobs

<http://fi.wikipedia.org/wiki/Apple>

http://en.wikipedia.org/wiki/Steve_Jobs

Edwin Hubble

Edwin Hubble was indisputably the most famous astronomy in 20th century. His biggest award was proof that our universe is expanding. Also the most celebrated space telescope, Hubble, have named to respect one of most important astronomy in history.



Hubble born September 28 1889 in Missouri. At school he was marvelous student with incredible athletic skills. He went to university of Chicago to play basketball at 1907. In 1910 he started learning law and took some courses of mathematic and astronomy. That led him to oxford learning science for four years later. After that he took astronomy to his main subject.

In 1917 he went to army as volunteer. During First Word War he was never in combat. After World War he went back to learn astronomy to Cambridge. In 1919, George Hale offered a staff position to Hubble in California. The job was in new Mount Wilson observatory which was just finished. Observatory had a huge 100 inch telescope for seeking space. It was biggest telescope until 1948. Telescope was big enough to research star clusters (group of stars), which Hubble assumed to other galaxies.

While other astrologist used telescope to research planets and Milky Way, Hubble started seeking nebula m31 star cluster. With that big telescope Hubble saw all those millions of stars. Other astronomers thought that those stars were in Milky Way, but Hubble was not sure. To proof that he used distance method which his collage Harlow Shapley invented to measure distances.

First have to find Cepheid, which is special kind of star with ability to change its light variation. Hubble sought star cluster for few years after he found Cepheid. Cepheid variation changes regularly with 1day to 50day periods. When period is longer, that brighter star is. Cepheid that Hubble found had period of 31.45D so that's mean it's 7000 times brighter than Sun. After calculating difference between real brightness and visible brightness will get distance between earth and star. It was over 900 thousand light years away, so it was far away from our Milky Way (width 100-170 thousand light years) and that's why nebula m31 had to be a new galaxy. Before that everyone expected Milky Way was only galaxy on universe, but now Hubble revealed that other galaxies existence. That galaxy was named as Andromeda.

Due this he received Newcomb Cleveland Prize in January 1 1925

Later other investigators discovered other kind of Cepheid in Andromeda, which were just like other Cepheid's in Milky Way. Hubble used different kind of Cepheid that have never before used to calculate distances, so Hubble had made mistake. The Andromeda was really over two million light years away.

During years Hubble defined distances of known nebulas (old name of galaxy). In 1929 he made another startling find. He spotted that galaxies are receding from us and velocity is increasing. Galaxies which were further recedes faster than closer galaxies. With his assistant, Milton Humason, he realized that your universe is expanding with increasing velocity. Einstein had made same decision couple of years before but he couldn't proof that.

They calculated speed of expanding with repeating measures. After that they had acceleration of expanding. When divide distance of galaxy with its acceleration they know age of your universe, 13.7 billion years. That was the most wanted information of astronomy.

In 1942 Hubble went to Second World War and came back in 1946 with the Medal of Merit. He continued regular job at observatory, but was in central role of designing Palomar Mountain observatory. In 1949 new observatory was finished with 200 inch telescope and Hubble got honor for telescope first use. Hubble continued work at Wilson and Palomar observatories until he died to cerebral thrombosis (a spontaneous blood clot in his brain) on September 28 1952. His wife didn't organize funerals and she buried her husband herself. She never revealed Hubble's burial site.

Aaro Jokela

Charles Darwin

Charles Darwin (12 February 1809 - 19 April 1882) was an English naturalist and biologist, who is well known for his contributions to evolutionary theory. Darwin showed that all species of life have evolved over time from common ancestors from a process that he called natural selection.

Charles was born into a wealthy family with five other children. Young Charles had a taste for natural history and collecting already at the age of eight. As he grew older he went to the University of Edinburgh Medical School, which was the best medical school in the United Kingdom. Charles found his lectures dull and surgery distressing which is why he later dropped out, as he was more interested in natural history and stuffing animals. The lack of studying annoyed his father, so he sent him to Christ's College which was located in Cambridge. Charles was still more interested in nature than studying, but as the final examinations approached he focused on his studies and managed to do well.

Charles planned to visit Tenerife with his classmates after graduation to study natural history in a tropical environment. After the trip he received a letter from Henslow. He was asked to leave for an unpaid two year trip to explore and map the coasts of South America with Robert FitzRoy. Despite the fact that Charles' father objected the trip, regarding it was a waste of time, he still ended up funding his son's participation. The Voyage of the HMS Beagle (ship) began on 27 December 1831 and lasted almost five years. Charles spent most of his time on the lands exploring the nature and making natural history collections while the Beagle surveyed and charted coasts. He kept notes of his findings and theoretical speculations, and at intervals during the trip his specimens were sent to Cambridge together with letters including a copy of his journal for his family.

When the Beagle reached the United Kingdom on 2 October 1836, Charles Darwin had already become famous in scientific circles. His collections from the voyage included fossil bones of gigantic extinct ground sloths as well as the Megatherium, a near complete skeleton of the unknown Scelidotherium and a hippopotamus-sized rodent-like skull named Toxodon resembling a giant capybara. These ancient creatures were related to living species in South America.

Charles released his book called *On the Origin of Species* on 22 November 1859. The book turned out to be unexpectedly popular, with 1,250 copies oversubscribed. Right after the release, Charles began writing the second part. After publishing his work Darwin's theory started a fierce battle in the scientific circles. Even though Darwin suffered from illness which kept him away from the debates, he followed the response, commenting on press cuttings, reviews, articles, and corresponded on it with his colleagues.

While *On the Origin of Species* is his most significant book, Darwin wrote other books as well. *The Descent of Man* and *The Expression of the Emotions in Man and Animals* had major impact, and his books on plants including *The Power of Movement in Plants* were groundbreaking studies of great importance, just like his final work on *The Formation of Vegetable Mould through the Action of Worms*.

Charles ended up marrying his cousin, Emma Wedgwood. The Darwins had ten children of which two died in infancy. Whenever the children felt ill, Charles feared that they have inherited weaknesses from inbreeding. Charles Darwin died at the age of 73. His death was caused by heart disease which was called angina pectoris. Darwin was buried in Westminster Abbey, close to James Maxwell, John Herschel and Isaac Newton.

Iikka Laurila

Sources: http://fi.wikipedia.org/wiki/Charles_Darwin

Nikola Tesla

Early life

Nikola Tesla was born in the year of the Lord 1856 in a Serbian town called Smiljan, nowadays a part of Croatia. Back then it was a part of the Austro-Hungarian Empire. He was a son to a priest father and his mother loved fiddling with machinery, even though she had no formal education. Tesla studied math and physics at the Technical University of Graz. He dropped out however and disconnected himself from his family and friends to avoid revealing his failed graduation. Later he studied philosophy at the University of Prague in 1880.

Days of inventing

His career as an inventor started at the age of 26 in Budapest while working at the Central Telegraph Office, where he first sketched the principles of a rotating magnetic field, a crucial part of another invention of his: the alternating current. He then moved to work for Thomas Alva Edison for the Continental Edison Company in France in 1882. Two years later he relocated to New York to work for Edison Machine Works. Edison offered him the task of redesigning the direct current system, which was ineffective at carrying electricity over long distances resulting in a maze of cables and having a power plant every square mile. He was offered roughly a million modern day dollars if he succeeded, and he did. Tesla had invented the alternating current, which uses thinner and fewer cables and can transfer electricity over long distances while being a lot more economical. We still use the same technology to power everything to this day.

When Tesla inquired Edison about his payment, Edison had this to say: "Tesla, you don't understand our American humor." After this Tesla and Edison had a falling out and Tesla moved on to work on his alternating current alone. This ignited a life long feud between the two.

During the years 1886-1887 Tesla hit rock bottom as he lost control of his company and all his patents. Working as an electrical repairman and sometimes as a ditch digger, he pulled through and formed another company and went on to invent the AC powered induction motor which uses a spinning magnetic field to turn the motor. He had a laboratory in Manhattan where he spent most of his time, thinking and tinkering with his machines.

In 1888 George Westinghouse licensed the induction motor and hired Tesla to work as a consultant at the Westinghouse Electric & Manufacturing Company in Pittsburgh. During the same year, Tesla demonstrated his motor and the AC system to the American Institute of Electrical Engineers. These events kick started what is known as the "War of Currents". It was rivalry between George Westinghouse who supported AC and Thomas Edison who supported DC.

In 1891 he lit electric lamps remotely demonstrating the potential of wireless power transmission. Later that year he patented the Tesla coil. In the first quarter of 1893, a Westinghouse engineer Benjamin Lamme improved upon Tesla's induction motor design, and the result was called "Tesla Polyphase System". The same year Westinghouse demonstrated the safety, reliability and efficiency of the AC system to the public at a World's fair in Chicago. Tesla himself demonstrated different electrical effects like the spinning magnetic field and a wireless gas-discharge lamp, a true wonder for its time. This was a crucial event in the history of AC and therefore extended to Tesla.

Tesla was the founding father of X-ray and radio technology, although that is debatable. He took the first X-ray image predating Roentgen's work by a few weeks. Guglielmo Marconi, the father of the radio used 17

of Tesla's patents. He received a Nobel prize for 'his work'. Tesla also had great influence over the power plant at Niagara falls, it was his idea to use AC systems to harness the power of the falls.

In 1900, he began planning and building the Wardenclyffe tower which was supposed to send radio signals overseas, but his funding was cut because Marconi beat Tesla to it. It was also supposed to, at least in theory, be able to wirelessly transmit electricity to a larger radius around it for free. This idea didn't get any supporters because it wasn't profitable. The tower was taken down in 1917 and the lands were taken in foreclosure in 1922.

He died alone in his hotel room in New York on the 7th of January 1943. His cause of death was coronary thrombosis.

Personality & habits

Nikola Tesla became a citizen of the United States in July 1891. He lived his entire life in celibate because women would have interfered with his research too much. He was very social when he chose to be, and got the attention of an abundance of ladies. He usually slept around two hours a night, dozing off from time to time during the day to "charge his batteries". He had a fantastic memory, rarely writing anything down and instead he pictured everything in his head and simply built it. He could memorize entire books perfectly and rumor says he had a photographic memory. Throughout his life he suffered from varying degrees of illnesses and mental issues, resulting in hallucinations, visions and flashbacks. In his later years he fed thousands of pigeons according to his own words and even nursed sick and injured birds back to health.

Saku Laurila

Stephen Hawking

Stephen Hawking is one of the greatest minds of our time. And most likely one of the smartest men ever lived. Hawking has a sickness that is called Amyotrophic lateral sclerosis (ALS). That is the reason why he has to move around using an electric wheelchair and talk with a speech-generating device. When the disease was diagnosed in 1963 he was given two years to live and yet he still lives today.

Stephen William Hawking was born on January 8th in 1942 in Oxford, England. When he was eighteen he went to study in Oxford university college where his father had studied earlier. He wanted to study Mathematics, but it wasn't possible in Oxford, so he decided to pursue physics instead. After he had studied three years he received a first class honours degree in Natural Science.

Soon he transferred to Cambridge to research Cosmology since there was nobody in Oxford who was researching the same area at that time. Soon he received his Ph.D. and later on he became a professorial fellow at Gonville and Caius College. Then in 1973 he left the Institute of Astronomy and six years later in 1979 joined the Department of Applied Mathematics and Theoretical Physics and became a Lucasian Professor of Mathematics until he gave it up in 2009. He is still active at the Cambridge university and he has an office at the Department of Applied Mathematics and Theoretical Physics. His current title is the Dennis Stanton Avery and Sally Tsui Wong-Avery Director of Research at the Department of Applied Mathematics and Theoretical Physics.

Stephen Hawking is best known for his work on the basic laws which govern the universe and he and Roger Penrose showed that Einstein's General Theory of Relativity implied space and time would have a beginning in the Big Bang and an end in black holes. And that if the universe obeys the general theory of relativity and fits any of the models of physical Cosmology it must have begun as a singularity. This basically meant that General Relativity had to be unified with Quantum

Physics. He also discovered that black holes aren't exactly black, but they emit radiation and eventually evaporate and disappear. Another hypothesis is that the universe has no edge or boundary in imaginary time. This would mean that the beginning of universe would be completely determined by the laws of science.

On the side of everything else he has also written several books including the best seller *A Brief History of Time*, *Black Holes and Baby Universes and Other Essays*, *The Universe in a Nutshell*, *The Grand Design* and *My Brief History* and many others. *A Brief History of Time* was one of the top 10 books for 237 weeks, which is longer than any other book before.

Professor Hawking has 12 honorary degrees. He was awarded the CBE in 1982, and was made a Companion of Honour in 1989. He is the recipient of many awards, medals and prizes, is a Fellow of The Royal Society and a Member of the US National Academy of Sciences.

Hawking also vigorously supports the many-worlds interpretation which in short means that he believes in alternate histories and futures.

Despite of his sickness Hawking has 3 children and 3 grandchildren. He has also been married twice; With Jane Wilde (m.1965 div.1995) and Elaine Mason(m.1995 div.2006). He had all of the children with Jane.

Stephen Hawking has also appeared on multiple shows and many of his books have been made in to movies. His story has also been made into two movies which of the more recent one came out in 2014 and received worldwide recognition. Stephen Hawking keeps on researching the unknown and keeps on proving himself as one of the smartest men ever lived on this planet.

Juha Lehtola, 2B

Steam engine

The mother of all engines is steam engine. It was one of the greatest inventions of all history and it has been in huge part of our lives ever since even though we don't always think about it. To day we can find same parts and features from modern engines than used to be used back in the day at steam engines.

Roots of this invention leads to end of 1690's when Denis Papin noticed that steam can be used to power up a motor. He is the one who invented that piston and cylinder can be used with steam and thats how he ended up with first steam engine that actually could move things around. First industrial machines were invented by Thomas Savery and Thomas Newcomen. It only took one hundred years for steam engine to be found in many different places. In the beginning of its journey it was found usually in trains. Steam engine trains where big break trough, because it was never tired, it was way more powerful than horse and it was faster. Because it became such a success, inventors started to look other possible uses of it. And Thats how they came up with ships made of iron that was powered with steam. Benefits of steam where huge in this field too. Ships no longer required wind and they could be much much bigger than old ones which ment that they where lots of particle at the time.

Steam engine works surprisingly same way as modern engines do. The main difference between them is fuel. In modern engine fuel is pumped on top of piston and then ignited by the spark plug. Thats how piston goes down in the cylinder rotating crankshaft. When crankshaft has rotated half way around the piston starts getting back up and exhaust is released from it's way. When piston has returned back up there will be more gas pumped on top of it again and that's when everything starts all over. Steam engine used to work same way put it did not need any lighting systems or fancy carburetors because steam was the thing that pushed the piston.

Meaning of this invention is incomprehensible. The world would never have been able to get to the point where it is now without the pure power that steam engines provided to us. After and as a result of steam engines industrialism was possible and then it happened. The effects of this started to affect people's lives immediately. New machines that have spread all over the world, production efficiency in agriculture led to problems in the countryside when people could not find work for themselves anymore. Newer machines with better engines which were developed from steam engines opened lots of new jobs in the cities for them. When people started to move from the countryside to cities started to grow as we know it built up little by little.

The future of the steam engine is not as bright as it was two hundred years ago. Nowadays inventors have enhanced the steam engine and it has transformed into modern diesel and petrol engines. This is the main reason we don't need old ones anymore. The fact is that we will not be seeing steam engines anymore except in museums. Steam engines still have a chance to come back. When we run out of oil we need to replace every single engine that used to use oil with new ones. Too bad that the development of biodiesel and electricity engines is too far for steam engines to have a real shot in this game.

Jani Mertala 3B

Stephen Hawking

An English theoretical physicist and cosmologist Stephen William Hawking is one of our most celebrated living scientists. He was born on 8 January 1942 in Oxford. His parent's house was actually in north London, but during the Second World War, Oxford was considered as a safer place to have babies. At the age of eight, Stephen and his family moved to St. Albans. Stephen went to St. Albans school when he was 11 and then on to University College, Oxford by following his father's footsteps. Stephen wanted to study Mathematics, although his father would have preferred medicine. But in the end Stephen ended to study Physics as it was not possible to study mathematics there at the time.

For the first 18 months in University College, he was bored and lonely: he was younger than many other students, and found the academic work "ridiculously easy". After three years and not very much work, he was awarded a first class honours degree in Natural Science. Hawking's last years in Oxford were difficult. After being diagnosed with motor neurone disease ALS, Hawking fell into a depression. But with the encouragement of Dr. Sciama, he returned to his work.

Hawking began his graduate studies. When Roger Penrose made theory of a spacetime singularity in the centre of black holes, Hawking applied the same thinking to the entire universe, and during 1965 wrote his thesis on this subject. His essay entitled "Singularities and the Geometry of Space-Time" got a good press.

Hawking had experienced increasing clumsiness during his final year at Oxford. He fell easily in stairs and had difficulties when rowing. Problems got worse and his speech became slightly unclear. When he got home for Christmas his family noticed differences and medical investigations started. Shortly after his 21 birthday in 1963 Hawking was diagnosed with ALS, also known as motor neurone disease or Lou Gehrig's

disease. When disease was diagnosed, Stephen's life expectancy was only two years. He slowly lost his ability to speak clearly and by the late 1970s he could only be understood by his family and closest friends. When his condition got worse, The National Health Service agreed to pay for a nursing home but Stephen's wife Jane Wilde was determined that he would live at home. The American foundation hired three nurses around the clock to take care of Stephen. This was a huge relief for Hawking's family with three children. One of those employed was Elaine Mason, who was to become Hawking's second wife.

For his communication Stephen used a computer program called the "Equalizer". By using the switch by his hand he selects phrases, words or letters from a bank of about 2,500-3,000 that are scanned and could produce up to 15 words a minute. Hawking gradually lost the use of his hand, and in 2005 he began to control his communication device with movements of his cheek muscles, a rate of about one word per minute. By 2009 he could no longer drive his wheelchair independently.

Hawking has published many books about the universe and our existence of which the most well-known is probably *A Brief History of Time*. The book answers to questions as "where did the universe come from? How and why did it begin? Will it come to an end, and if so, how?" Stephen has also written books named *A Briefer History of Time*, *The Grand Design*, *My Brief History*, *The Universe in a Nutshell* and Children's fiction books which he has written with his daughter Lucy.

So why is Stephen Hawking our most famous living scientist? He showed that at one point everything in universe was squeezed into a singularity which then exploded to the Big Bang. This huge explosion formed eventually galaxies, planets, stars; everything existing we know. The marvelous thing is that he came up with all these great theories without able to write anything down. He did it all by thought alone.

Lotta Ojala

Nikola Tesla

Nikola Tesla (1856-1943) was a Serbian-American inventor, physicist, mechanical engineer, electrical engineer, and futurist. Tesla is best known for his contributions to the modern alternative current electricity supply system and for inventing AC motor. Tesla was one of the first people to present the possibility of wireless communication. Though he was famous and respected, he was never able to achieve the kind of long term financial success his former employer and rival Thomas Edison acquired.

Early years

Tesla was born to Serbian parents in modern day Croatia, then part of The Austrian Empire. When Tesla was young, his brother Dane was killed in a horse-riding accident. The shock of the loss unsettled young Tesla, who reported seeing visions, which might have been a sight of some mental illness. Nikola was excellent at school and has claimed to have worked from 3 a.m. to 11 p.m. every day. However at the end of university he got addicted in gambling and never graduated.

Few years later Tesla moved to France and began working for the Continental Edison Company. Two years after that he resettled in New York City to work for Thomas Edison. At one point Edison told Tesla he would pay fifty thousand dollars for an improved design for his DC dynamos. After months of work, Tesla presented a solution and asked for the money. Edison demurred saying, "Tesla, you don't understand our American humor." Tesla resigned soon after.

Life in America

After parting ways with Edison, Tesla tried to form his own Tesla Electric Light Company, which developed improved electrical arc light based illumination systems. However Tesla was forced out of the company by its investors and for a time had to do manual labor for living. By the end of the year 1887 Tesla was able to find interest in his AC

electrical system and got the necessary funding to start working amongst AC electricity again. Tesla's patents for his AC motor caught the attention of American engineer and business man George Westinghouse, who hired Tesla, licensed the patents for his AC motor and gave him his own lab. Growing interest in an alternating current system put Westinghouse and Tesla in direct competition with Thomas Edison and his direct current system. This event is known as "War of Currents". Tesla continued in his work and patented several more inventions during this period, including the "Tesla coil," which laid the foundation for wireless technologies and is still used in modern radio technology. The competition resulted in Edison Machine Works switching to AC development and by 1892 Thomas Edison was no longer in control of his own company. In addition to his AC system and coil, Tesla developed many notable inventions including dynamos and the induction motor, and was one of the first to discover X-ray technology, radar technology, remote control and the rotating magnetic field.

Wardenclyffe Tower

When Tesla's laboratory in New York burned with years worth of notes and equipment in 1895, he moved to live his last decades in a New Yorker Hotel. He then became obsessed with the idea of wireless transmission of energy, and began to work on his most ambitious project yet, the "Tesla Tower". Tesla's purpose was to create a wireless communicating system. The tower was also meant to transmit electrical energy wirelessly to the whole planet through the Ionosphere and the ground. Soon doubts arose among his investors about the plausibility of Tesla's system and he had to abandon the project. Two years later Tesla declared bankruptcy and the tower was deconstructed. Poor and lonely Tesla died in his hotel room on January 7, 1943, at the age of 86, but the legacy of the inventions he left behind lives on to this day.

Kalle Palokangas

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SOLAR PANELS

In 1838 French Edmund Becquerel, at age 19, managed to change the light into electricity. However, his studies concerning photovoltaic effect did not lead to practical applications. In 1883 American inventor Charles Fritts developed solid state photovoltaic cell by coating the semiconductor selenium. His invention could change 1-2 percent of the sun energy into electricity. In 1923 Albert Einstein got the Nobel Prize from his theories which explain the photovoltaic effect. In 1956 the first solar cell came into the shops. Price was 300 dollars per watt and them was used on radios and toys. The first satellite which uses solar energy to the production of the electricity was fired in 1958. In 1970s energy crises brought out to the search of alternative sources of energies. Solar panel electricity's price fell and then price was about 20 dollars per watt. In 1983 the worldwide production of the sun electricity exceeded 21.3 megawatts and sales 250 million dollars. After that solar panels development has continued and still continues.

The solar cell changes the energy of the radiation of the sun directly into electric energy. The energy of the photons of the radiation loosens the electrons of the semiconductor substance of the solar cell in which case electrode hole pair form. A electric field inside the layers P and N of the cell affects these in which case the electrons are carried to the negative electrode of the cell and the holes to a positive one. The load is connected between the electrodes with cables in which case a circuit is created and the electrons go through it. This is an electric current. The sun electricity system can be connected to public mains supply from which, if necessary, reserve power is obtained and along which the produced surplus electricity can be sold to an electricity company. When using a mains voltage, the level electricity produced by the solar panel is converted into the alternating current of 230 volts. If the connection to the mains has not, generally used as reserve power batteries.

The most general sun electricity system which is attached to the net panels size is about 100x165cm and panel's power is about 250 watts. Solar cells can be categorized into silicon-based cells and cells which is based on thin-film technology. Silicon-based cell's functional part is 100-300 μm and on the other cell it's 1-10 μm . The cells which are based on the thin-film technology are more important in the industry because the the thin-film technology requires fewer raw materials and one can adapt more easily to the mass production.

Solar energy is renewable energy in which is not fuel expense. Solar energy doesn't deliver carbon dioxide emission or waste. Solar panel has also disadvantages. They are expensive, efficient is only about 15 percent and the emissions caused by the making are high. However, solar panels continuing developing lower prices and improve efficient. Substances develop and new technology helps to decrease the emissions caused by the making.

In Finland each square meter receives about 1000 kilowatt hours of solar radiation per year. It is almost as much as for example in Germany. In Finland solar energy avail is emphasized summer when causing by long days revenue is large.

Venla Pennanen

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Antikythera mechanism

Computers and other technological appliances are self-evident for everyone. All the time there are people working for new technological inventions. We cannot even imagine what is coming up in future.

Technology is so advanced and modern nowadays. We could think that all technological inventions are made in this century but we are not the first intelligent people.

In 1901 there were some Greek sponge divers diving near the island called Antikythera. They were on journey and wanted to find some sponges. Elias Stadiatis dived 42 metres and there loomed the shape of a great ship out of the blue. He returned to the surface to inform other divers. By accident they found this ancient "an astronomical computer" from a rocky wreck. They found also some other pottery as jewellery and statues. This find has changed people's thoughts about ancient know-how. Already ancient time inventions have been high-technological. Not until last half century researchers has began to reveal secrets about this mechanism.

There have been many assumptions for mechanism's meaning and that has created conflicts between researchers. Antikythera mechanism was once in a woody box which was approximately 32x16x10 cm. This box was carried to the museum. First two years this box was quite insignificant because it was so busy time in the museum. Then in 1902 archaeologist Valerios Stais was examining box and he noticed there were gearwheels inside. Self this mechanism was found then. Mechanism operation based on 32 bronze gearwheels that demonstrated precisely planets movements. Mechanism is more complex than clockwork that has been compared to this mechanism. However it was ancient world clock. The dial is divided to twelve 30 degree sectors that reflects horoscopes. In front of mechanism there is two scales that describes the path through the heaven. Backside there is five dials, two large displays and three smaller

indicators. Mechanism has used to astronomical calculations. It is also believed that mechanism had been used to indicating religious celebrations time. Researcher Derek De Solla Price believes that it was only exhibit in Rhodes that was famous for its mechanical sculptures. Front of device there is a dial which defines positions of the sun and the moon in zodiac every day in a year. Backside there is dials for solar eclipses and moon phases. This kind of information has been found by radiological researches. Researchers decided to manufacturer own specific radiological instrument with cost several hundred thousand euros.

It has been figured out that the mechanism has been made about 87 BCE. Mechanism's settings and its faces have revealed this. Few years later mechanism was lost by sinking ship. It has been suggested that the ship was going to Rome with these treasures. The original mechanism is not in one piece. 2000 years on salt water and other treatments has destroyed it. Mechanism's largest preserved part is on display at the National Archaeological Museum in Athens. It has been made several researches about Antikythera mechanism because it has been hard to figure out the right purpose for device. The latest survey has been announced for 2014.

Assumption is that the inventor of this mechanism is Archimedes. That is why the other name for Antikythera mechanism is Archimedes' planetarium. Archimedes was an ancient Greek philosopher, physicist, astronomer, mathematician, engineer and inventor. He was the father of mathematical physics. The inventor must has been mathematically talented and best proposal for inventor is Archimedes. Mechanism had been designed to predict celestial phenomena. Machine is a glorious exhibition of ancient know-how.

Inka Poukkula

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Xylitol

I will tell you about xylitol. You can think that it is a Finnish invention. As a molecule xylitol is not a Finnish invention. Xylitol was first discovered almost at the same time by German and French chemists. But later Finnish scientists found that it is beneficial for dental health. Xylitol is a popular invention worldwide. Chemically it is a sugar alcohol, not actually a sugar. It is a natural sweetener. It looks and tastes just like regular table sugar. Xylitol is a natural product. Most of the fruits and vegetables have small amounts of xylitol. There is xylitol in our bodies too. Xylitol is produced from birch trees or corncobs. There are two types of xylitol; corn cob xylitol and birch wood xylitol. The end resulting product is the same but the process to extract it from two sources is not the same. It is said that corn cob xylitol is better than birch wood xylitol because corn cob xylitol is more environmentally friendly than birch wood xylitol.

German chemist Emil Fisher and French chemist M.G. Bertrand found xylitol in the late 19th century. After that, it was known in Europe as a safe sweetener especially for people with diabetes. But it was not until in 1970 when Finnish scientists at University of Turku found its dental benefits. This study became known as the "Turku sugar studies". The first xylitol chewing gums in the world were produced in Finland. Nowadays xylitol is used as a sweetener in many products which are sugar free, such as xylitol chewing gums and medicines.

Xylitol has many health benefits. It prevents dental caries. It can also fix some dental damages that have just started. Xylitol reduce the amount of dental plaque. Some of us suffer from dry mouth and xylitol can help with that problem because it secretes the amount of saliva.

People with diabetes can usually use xylitol because sugar alcohols have a fewer impact to blood sugar than table sugar. Studies show that if mother use xylitol products regularly, it prevents her young child's dental caries. By using chewing gums which are full of xylitol can be reduced significantly young children's middle ear infections. Xylitol has 33% fewer calories than table sugar. That's why it is healthier option than table sugar. Xylitol tastes fresh.

The amount of xylitol you need is 5-10 grams per day. Xylitol products should use in small portions several times a day, always after meals and snacks. But it has to remember that xylitol don't replace tooth brushing. Xylitol is safe for humans. If you use large amounts of xylitol, it can causes laxative effects such as diarrhea. Xylitol is highly toxic to dogs. When a dog eats xylitol, its body start to produce large amount of insulin.

Sofia Pyykkönen 2c

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Appearance pressures

Appearance pressures are a modern phenomenon especially among teenagers. Let's go back in time when Marilyn Monroe represented the look of ideal woman with natural looking skin and a normal, healthy bodyweight. Today when you look at the magazines and TV- commercials you see long women with *extremely* low body fat and just unhealthy, skinny and bony appearance. They call this beauty nowadays. People compare themselves in front of a mirror to skinny, make-upped and photoshopped models that aren't even real. This is when all the problems begin. Especially teenagers who believe everything will suffer the most and try to look different than they actually want to look.

Appearance pressures make media and social media contradictory. Social media has always spread the message about people being and looking different and suddenly social media and commercials are filled with unhuman looking models and we are expected to look the same. In reality the people we admire are not completely perfect. What even makes a perfect person? According to what studies say about a perfect looking person, media is giving us wrong pictures of the perfect look.

Let's break down the appearance pressures the media makes of both women and men.

In the TV- commercials, especially underwear models look always the same. The men models are about six feet long, more muscular than most of people in the world and also with a very low body fat, in other words the models are long with a fit and muscular body and they also look like having no imperfections anywhere and even no body hair at all except for beard and hair. Men will look at themselves in the mirror and think they're not good enough because they might not see so much muscle or their bodies are not even close to what media makes us feel about how we should look like. Some will feel like they're not enough for themselves and start wanting to look different, these are the appearance pressures.

An ideal looking women nowadays is supposed to look skinny, long and the skin must be soft like silk. Teenager girls will look at the models and want to look the same. This might cause them to starve themselves or make them exercise like a mad with the purpose of losing weight when there isn't a need for that. They will become blind to the looks of ideal women the media is giving to us.

There were mostly the bad effects of media showing the ideal looks and giving us pressures about outlook. It's not all about the negative sides, there are also good things about the media. In the last years for example fitness has become a very common thing in people lives by advertising sport wear, sport gear and much else relating to sport. For example in sport wear advertises the models look healthy and people might wake up and focus more on their health. In the last years the fitness boom has become stronger and stronger making people do sports more, eat healthier and do changes about the bad habits in their live. Fitness boom motivates people and gives them the power to keep on doing when the media gives the motivation in good limits and not making people feel like they get forced to look like something that isn't realistic. Example of bad and misleading advertising is when there is for example a giant bodybuilder advertising a product promising people that actual product will help them build more muscle and become like they're.

In other words appearance pressures by media has two sides and it's up to you will you stick to what is told around you.

Joonatan Ylitolonen

Lähteet

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Leonardo da Vinci

Leonardo da Vinci has been perhaps one of the most celebrated human in the world. He was an Italian scientist and artist. There have been told that, he was one of the greatest painters of all time. He lived in the Renaissance period. It's said that Leonardo was extremely curious and he also had excellent imagination. He was also exceptionally multitalented so he was an archetype and a role model of the Renaissance man.

Leonardo da Vinci was born on 15.4.1452 in Vinci. Leonardo's full birth name was Lionardo di ser Piero da Vinci. Hence, his last name "da Vinci" meant only that he was from Vinci. Vinci is a city located in the Tuscan area in Italy. Leonardo's father was Messer Piero Fruosino di Antonio da Vinci who was a Florentine legal notary, instead his mother was a peasants daughter. In the time when Leonardo was born a relationship between legal notary and peasants daughter was not accepted. Therefore Leonardo was an illegitimate child. There are not much known about his early childhood.

Da Vinci is known for his paintings, but also his inventions have interested people through the ages. Da Vinci was probably ahead of his time. He had designed for example a helicopter, a tank, a car and a calculator. Most of da Vinci's designs were not even implement on his lifetime. But there are few smaller inventions from da Vinci, like a machine for testing the tensile strength of wire and an automated bobbin winder, which was put to use.

When da Vinci was fourteen he achieved a position as an apprentice in Verrocchio's workshop. Verrocchio, whose real name was Andrea di Cione, was an artist and his workshop was one of the most respected in Florence. In addition to basic artistic skills, like drawing, painting, sculpting and modelling da Vinci learned many other techniques. Some of those techniques may have been chemistry, metal working, plaster casting and drafting. In 1478 he became an independent master.

Da Vinci lived in a very unstable era and that's why he had to move so many times. Da Vinci spent much of his earlier working life in Milan. There he worked for instance as an architect, painter, sculptor and engineer for the Sforza family. In Milan he produced one of his most famous works, *The Last Supper*. *The Last Supper* is painted in the Monastery of Santa Maria delle Grazie and it's made from 1495 to 1497. Da Vinci later worked also in Rome, Bologna and Venice.

In about 1499 da Vinci returned to Florence because Milan was invaded by the French and the Sforza family had to escape. Da Vinci painted the other of his the best known works, *Mona Lisa* during his time in Florence. He also painted several other portraits but *Mona Lisa* is the only one that survived. *Mona Lisa* is painted on a poplar panel by oil paint. Nowadays *Mona Lisa* is at the Louvre Museum in Paris and it is property of the French Republic.

Da Vinci returned to Milan in 1506. He lived in Milan until the French king Francis I invited him to France and gave for his use the manor house Clos Lucé near the king's residence at the royal Château d'Amboise. Da Vinci spends his last years there and died in 2.5.1519.

Leonardo da Vinci, mysterious person who seemed to be able to do anything he wanted, has interested people all over the world. Da Vinci's output have fascinated many different fields of science. The legend of a supreme genius is still alive.

Jenna Hökkä

Wilhelm Conrad Röntgen

Wilhelm Conrad Röntgen is a German physicist, who won the first Nobel prize for physics in 1901. He was born on 27. March 1845 in Remscheid, and died on the 10. February 1923 in Munich.

Even though he didn't have an Abitur (German high school graduation) he was going to study. He was kicked out of school, for a fault he did not commit.

Because of an entrance examination, which he passed, he could go to the university Zürich in year 1864. Two years later, on the 6. August he got a his diploma as a mechanical engineer. After that he starts to study physics, and doctorate on the 22. June 1869 in physics, with a work about gases.

1870 he written his first scientific discourse. 1874 Röntgen get his habilitation and became a professor in 1875 for physics and mathematics. In the year 1893 he became the director of the university Würzburg, but with this he have not stop work on his own projects. So that his pioneering invention came out in 1895. He discovered the so called: X-rays in November. And just one month later he published the first recording. It shows the hand and wedding ring from his wife. With this work he get the first Nobel prize that has ever been presented in physics.

People who knew Wilhelm Conrad Röntgen have described him as a very hard working and carefully person. He has been very modest and righteous. When he get to know that his invention could be a very big help for the medicine and could produce faster and cheaper he renounced the patent. And explain it with the word that his invention and detection is for the whole society and not only for him, a brand or a company.

Because if his X-rays, other people could discover other kind of rays. One of them was the discovery of radioactivity and thus also the basis for the research from Becquerel, Marie and Pierre Curie, who gets also a Nobel prize just two years later, in 1903.

But it was not only the basis for the work from Becquerel and the Curies, and the start of radioactivity research.

In our days it is not only a machine in the hospital, it helps with the exploration of the microcosm by using an X-ray microscope.

It is also a new sub-section of astrophysics and helps to explore space. And it helps at materials testing, which is often used for metal.

On the first of April 1900, one year before the Nobel prize, he was leaving the university of Würzburg and goes to the university of Munich.

Four years before his death, the trigger was colon cancer, he became an honorary member of the German Physical Society.

In the German language his invention is named after him, so that everybody in Germany knows his name but not his story.

Mira Blank

Nostradamus

Michel de Nostredame (depending on the source, 14 or 21 December 1503 - 2 July 1566), usually Latinised as Nostradamus,]was a French apothecary and reputed seer who published collections of prophecies that have since become famous worldwide. He is best known for his book *Les Propheties*, the first edition of which appeared in 1555. Since the publication of this book, which has rarely been out of print since his death, Nostradamus has attracted a following that, along with much of the popular press, credits him with predicting many major world events.

Nostradamus was born in his father's side in a Jewish family December 14, 1503 in Saint- Rémy -de- Provence, southern France.

He felt a calling to the medical profession and began his studies, but was forced to retire in 1525 , they bubonic plague season due . He circled around the country taking care of highly infectious disease victims and received medical studies carried out four years later.

Nostradamus began to practice medicine in 1533 brought to agen a town called Garon the years and got married. The couple had two children. The next ten years , Nostradamus circled to heal the sick , and he became known as the miracle maker . Nostradamus built his house in the attic of the observatory , which began to draw predictions , which are published in almanacs . By 1555 , he had produced a total of 2 000 prediction.

Nostradamus reputation grew and grew until his death 1566. According to some interpretations , he also foretold his own death : " Desktop and the bed close to me found dead. " One night, suffering from gout Nostradamus, announced that he would be able to survive to survive the next night, and the next day he was indeed found dead in the bedroom desk up close.

Predictions

Nostradamus prophecies used indecipherable language , which was based on the French spiced Greek, Italian, Spanish , Hebrew and Latin words. The predictions were written like poems quatrain. Nostradamus engaged in a sideline activity also astrology, according to which the events of history are cyclical . This belief, he seems to have used the assistance , in particular in the annual almanac prediction. Nostradamus texts have been interpreted when each to their own time -related predictions . These include , for example, anti-Christ's named Napoleon and Adolf Hitler . Interpretations of the texts have been found in the Third World . Group contrast , inter alia, forecasts, interpretation of the third millennium , and the threat of becoming the then Persia (Iran) in the area .

One of the most famous prophecies of Nostradamus, the French King Henry II in the prediction of death , which he introduced in 1555 , in its *Les Prophecies M. de Nostradamus* , peering . The work contained 99 other four strands prediction.

" The younger lion wins a parent , abnormal duel on the battlefield , in the golden cage of his eyes break out , the two estates to one, then die cruelly."

Nostradamus and the Queen Catherine tried to warn and deter in 1559 Henry II of its participation in the three-day tournaments . Henry II took part and on the third day took place in a jousting accident. The king died. Mentioned in prophecy , " the older lion" is interpreted as Henry II, as he greeted the Duke of Montgomery's " younger lion ."

Urho Haho

Leonardo Da Vinci

Leonardo da Vinci was born on 15 April 1452 near the Tuscan town of Vinci, the son of a local lawyer. Leonardo was born outside of marriage. Leonardos mother was a peasant Caterina.

He was the apprentice to the painter Andrea Del Verrocchio in Florence and later in year 1478 became a master. In about 1483, he moved to Milan to work for the famous Sforza family as an engineer, sculptor, painter and architect. Da Vinci was in Milan until the city was invaded by the French in 1499 and the Sforza family forced to escape. He may have visited Venice before returning to Florence. During his time in Florence, he painted several portraits, but the only one that got noted is the famous Mona Lisa.

In year 1507 Leonardo got an invitation from French king Francis 1. Followed by the invitation Leonardo moved to France and also died there two years later. Story tells that king was holding Leonardo`s head on his arms while he was dying. Place of death was at a fine castle of Clos luse. Most of the Leonardos testament belonged to Italian painter Francesco Melzi who worked as a guardian for Leonardo and happened to live with him for his three last years in France.

Inventions

As an engineer for a number of years, he did a fair amount of work with artillery, gunpowder, and fighting machines. He saw them as a way to study the physics of objects moving at high speeds, not as weapons. He was able to study physics while still getting paid. He invented multi-barreled guns and even steam-powered guns. At the time he had even thought of more efficient ways of bridge building by developing light, strong, and effective bridges, and also ways to destroy such powerful bridges.

Leonardo da Vinci may well have been the greatest inventor in history, yet he had very little effect on the technology of his time. Da Vinci drew

sketches and diagrams of his inventions, which he preserved in his notebooks, but either he lost interest in building them or was never able to convince one of his wealthy friends to finance construction of his inventions. As a result, almost none of da Vinci's inventions were built during his lifetime. And, because he never published his diagrams, nobody else knew about them until his notebooks were discovered long after his death. One of his most famous inventions was the parachute of which Leonardo was among the first to discover such intelligent use of physics.

Paintings

Leonardo has drawn paintings that are known throughout the world. Leonardo has often been described as the "Renaissance man", a man whose infinite curiosity was equaled only by his curiosity on invention. He is widely considered to be one of the greatest painters of all time and perhaps the most diversely talented person ever to have lived. It is primarily as a painter that Leonardo was and is known.

Two of his works, the Mona Lisa and The Last Supper occupy unique positions as the most famous and most reproduced portrait and religious painting of all time. Mona Lisa located at the museum of Louvre in Paris. Millions of people visit there every year to see maybe the most appreciated painting ever known.

Leonardo's drawing of the Vitruvian Man is also iconic and known because of the anatomic accuracy. Vitruvian man also appears in Italian one euro coin.

Lauri Jussila

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