

Speaker's manuscript – All Nobel Prizes 2019

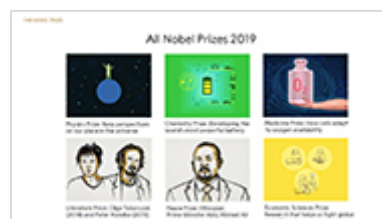
The Nobel Prize

- Before Alfred Nobel died on 10 December 1896, he wrote in his will that the bulk of his fortune should be used for prizes to "those who, during the preceding year, shall have conferred the greatest benefit to humankind".



The Nobel Prizes 2019

- According to Alfred Nobel's will the bulk of his fortune should be divided into five parts and to be used for prizes in physics, chemistry, physiology or medicine, literature and peace.
- The first Nobel Prizes were awarded in 1901.
- In the late 1960s, Sveriges Riksbank (Sweden's central bank) established the Economic Sciences Prize in memory of Alfred Nobel.
- The Nobel Prizes are announced at the beginning of October every year. In 2019, 15 men and women were awarded a Nobel Prize.
- The Economic Sciences Prize is awarded at the same time as the Nobel Prize, as part of the same ceremony on 10 December every year.



Let's take a closer look at the achievements of the 2018 Nobel Laureates and how they have benefitted humankind.

The Nobel Prize in Physics

- The 2019 Nobel Prize in Physics is all about the universe and its history.



The 2019 Physics Laureates

- One part of the prize, to James Peebles, is about theories of how the universe evolved and what it consists of. For example, there seems to be "dark matter" and "dark energy" that we don't yet know anything about.
- The other part of the prize, to Michel Mayor and Didier Queloz, is about planets in other solar systems. The discovery of a planet orbiting around a star similar to our own sun raises questions about whether there may be life elsewhere in the universe.



Dark matter and dark energy

- James Peebles took on the cosmos, with its billions of galaxies and galaxy clusters. His theoretical framework, which he developed over two decades, starting in the mid-1960s, is the foundation of our modern understanding of the universe's history, from the Big Bang to the present day.
- Peebles' discoveries have led to insights about our cosmic surroundings, in which known matter comprises just five per cent of all the matter and energy contained in the universe. The remaining 95 per cent is hidden from us. This is a mystery and a challenge to modern physics.



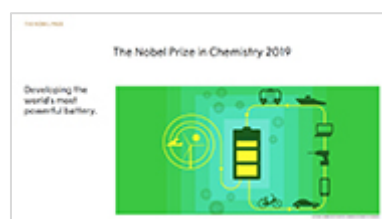
The exoplanet 51 Pegasi b

- In October 1995, Michel Mayor and Didier Queloz announced the first discovery of a planet outside our solar system, an exoplanet, orbiting a solar-type star in our home galaxy, the Milky Way.
- At the Haute-Provence Observatory in southern France, using custom-made instruments, they were able to see planet 51 Pegasi b, a gaseous ball comparable with the solar system's biggest gas giant, Jupiter.
- This discovery started a revolution in astronomy and over 4,000 exoplanets have since been found in the Milky Way.



The Nobel Prize in Chemistry 2019

- The 2019 Chemistry Prize is about the development of the lithium-ion battery: a technological revolution.



The 2019 Chemistry Laureates

- The 2019 Chemistry Laureates developed a rechargeable, lightweight battery powerful enough to be used in many different fields, for example mobile phones, pacemakers and electric cars.
- M. Stanley Whittingham, John B. Goodenough and Akira Yoshino did not work together, but their research was based on making improvements in each other's discoveries.



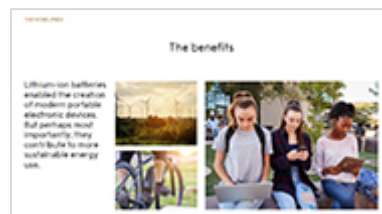
The development of the lithium-ion battery

- Metallic lithium is the lightest solid chemical element.
- The foundation of the lithium-ion battery was laid during the oil crisis in the 1970s. Stanley Whittingham worked on developing methods that could lead to fossil fuel-free energy technologies. The result was a rechargeable lithium battery that worked at room temperature and – literally – had great potential.
- However, metallic lithium is reactive and the battery was too explosive to be viable.
- John B. Goodenough was familiar with Whittingham's battery. Based on his knowledge of materials he improved it. Whittingham's battery generated more than two volts and Goodenough's was almost twice as powerful, at four volts.
- This was a crucial step in the development of portable electronic devices, which required lightweight, rechargeable batteries.
- In 1985, Akira Yoshino succeeded in eliminating pure lithium from the battery, instead basing it wholly on lithium ions, which are safer than pure lithium. This made the battery workable in practice.



The benefits

- Lithium-ion batteries are used globally to power the portable electronics that we use to communicate, work, study, listen to music and search for knowledge.
- This lightweight, rechargeable and powerful battery is now used in everything from mobile phones to laptops and electric vehicles.
- Lithiumion batteries have also enabled the development of long-range electric cars and the storage of energy from renewable sources, such as solar and wind power.



The Nobel Prize in Physiology or Medicine 2019

The 2019 Medicine Prize is about what happens in cells if they receive too much or too little oxygen.



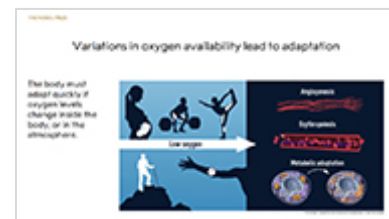
The 2019 Medicine Laureates

- When the amount of oxygen increases or decreases inside a cell, it must adapt itself.
- The 2019 Nobel Laureates, William G. Kaelin Jr, Sir Peter J. Ratcliffe and Gregg L. Semenza, have found out what reactions then occur in the cell, what substances are active and how they affect each other.
- They contributed various pieces to the puzzle, and as a result we now have a detailed picture of how cells adapt to the body's oxygen supply.



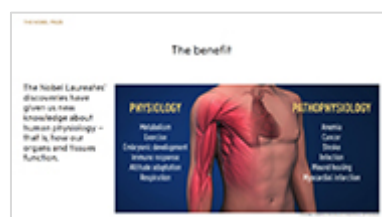
Variations in oxygen availability lead to adaptation

- The red blood cells perform the task of picking up oxygen in the lungs and then transporting it to all the cells in our body. Without oxygen, a cell can't convert food into usable energy. The cell uses this energy to perform many different tasks that are important so that we can function and feel well.
- Sometimes there are changes in the availability of oxygen to certain cells in the body. For example if you have a wound, blood can't reach all the cells around the wound. Another example is when a muscle is at work. Then it uses more oxygen, because the muscle needs more energy to move.
- When you are at a high altitude, there is less oxygen in the air, which leads to a lower oxygen level in your blood. If so, all cells throughout your body will receive less oxygen.
- Oxygen sensing is also essential during foetal development – for controlling formation of an unborn baby's blood vessels and placenta development. When cells adapt to oxygen availability, this may lead the body to form more red blood cells, slow down respiration or form more blood vessels.



The benefits

- The Nobel Laureates' discoveries have given us new knowledge about human physiology – that is, how our organs and tissues function. We now understand better what happens during foetal development, exercise and adaptation to high altitudes. We know more about how our metabolism and immune systems are affected by oxygen availability.
- The Nobel Laureates' discoveries have also increased our knowledge about diseases, for example anaemia and cancer. Hopefully this will enable us to develop new medicines.



The Nobel Prize in Literature 2018 and 2019

- 2019 was a special year in the history of the Literature Prize. The Swedish Academy – the institution that selects the Nobel Laureates in Literature – decided in 2018 to postpone the announcement of that year's prize until 2019.
- So on 10 October 2019 the Nobel Prizes in Literature for two years during was announced.



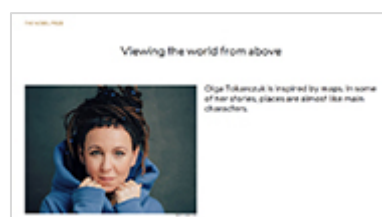
The Literature Laureates 2018 and 2019

- The 2018 Nobel Prize in Literature was awarded to the Polish writer Olga Tokarczuk, and the 2019 Nobel Prize in Literature was awarded to the Austrian writer Peter Handke.



Olga Tokarczuk – viewing the world from above

- 2018 year's literature laureate Olga Tokarczuk is one of Poland's best-known and most highly acclaimed writers. A trained psychologist, she writes novels, short stories and poetry.
- Olga Tokarczuk is inspired by maps and by viewing the world from above. Her main focus is on Polish landscapes and stories. In some of her works, it is even as if places are the main characters, for example in her novel *House of Day, House of Night* (2002), where many small stories about the lives and migrations of people in the Silesian landscape contribute to a rich portrayal of this area in southwestern Poland.
- Tokarczuk is called the master of the quick portrait, since she can portray figures glimpsed only at places like airports and hotels in a way that invites the reader to guess about them.



Peter Handke – a long and varied literary career

- Peter Handke, an author for more than 50 years, has written novels, essays, notebooks, dramatic works and screenplays.
- Peter Handke believes that one point of departure of his writing is personal catastrophe. We can see this, for example, in his book *A Sorrow Beyond Dreams: A Life Story* (1972), where he briefly but affectionately writes about his mother after her suicide. In the book, he tries to tell his mother's story based on how people viewed the role of women during her lifetime.
- Handke explores the memory of the dead and his own origins in several works. At the same time, they are full of the joy of discovery – of viewing the world in new ways.



The Nobel Peace Prize 2019

- The 2019 Nobel Peace Prize is being awarded to Ethiopia's prime minister, Abiy Ahmed Ali.



The 2019 Peace Prize Laureate

- Abiy Ahmed Ali is being rewarded for the reforms he has already implemented in Ethiopia, but above all for having taken the initiative to resolve the border conflict between Ethiopia and Eritrea.
- In a statement accompanying the prize announcement, the Norwegian Nobel Committee – which selects the Peace Prize Laureates – also highlights the role Abiy Ahmed has played in peace and reconciliation processes elsewhere in East and Northeast Africa.



The conflict between Ethiopia and Eritrea

- Ethiopia is located in Northeast Africa. With about 110 million inhabitants (2019), it is the second most populous country in Africa, after Nigeria. The country's economy is growing, but one fourth of the country's inhabitants live below the poverty line.
- After the Second World War, the United Nations decided that Eritrea should enter into a federation with Ethiopia. This led to conflicts, and in 1961 Eritrea began an armed struggle for independence that would last for three decades. In 1993 Eritrea became an independent country.



- In 1998 war again broke out between Ethiopia and Eritrea. This war continued until 2000 and cost nearly 100,000 people their lives. Among the reasons behind the war was a dispute about how to draw the border between the two countries. As a result, tensions remained and the countries became isolated from each other.

Peace agreements and reforms

- When Abiy Ahmed became prime minister of Ethiopia, he announced that his country would now hand over the areas that belong to Eritrea.
- In July 2018 Abiy Ahmed and Eritrean President Isaias Afwerki signed a new Joint Declaration of Peace and Friendship, in which they agreed to restore diplomatic relations and reopen telecommunication links and air routes between their countries.
- Abiy Ahmed has also quickly implemented numerous reforms in Ethiopia. This has included releasing thousands of political prisoners, strengthening freedom of expression, increasing the role of women in political and community life.



The 2019 Economic Sciences Prize

- The 2019 Prize in Economic Sciences is about combating poverty. The prize rewards research that helps us understand how we can effectively fight global poverty.
- In brief, it involves dividing this big issue into smaller, more manageable, questions. Such smaller questions can often be answered with the help of carefully designed experiments that are conducted on-site: so-called field experiments.



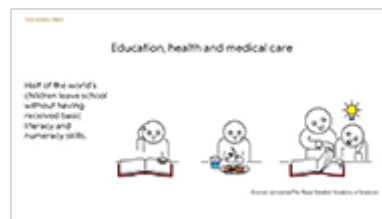
The 2019 Laureates in Economic Sciences

- The 2019 Laureates – Abhijit Banerjee, Esther Duflo and Michael Kremer – have found new ways of conducting research on how to fight poverty.
- Kremer was first, with his experiments in the early 1990s. Today all three Laureates often work together.



Education, health and medical care

- The Laureates' first studies focused on what measures raise the knowledge level of students in low- and medium-income countries. Would it improve, for example, if they had more textbooks or free school meals?
- By conducting a number of field studies, they showed that more individualised instruction and tutoring for the weakest students is the best way to boost student results.
- The researchers have also investigated whether to charge for medicine and health care, and if so, how much? In Kenya, Michael Kremer and his colleagues discovered that many parents couldn't afford to buy medicines for their children, even if it cost only a few US cents. The team came to the conclusion that medicines and preventive health care should be free.



Their research has influenced public policy

- The Laureates' research has dramatically improved our ability to fight global poverty. More than five million children in India have received remedial tutoring in schools, and many countries have introduced heavy subsidies for preventive health care.
- Their research has shown what methods are the most effective for solving some of the problems associated with poverty, and what measures political leaders should thus invest in.



Awarding the Nobel Prize

- On 10 December each year, the Nobel Prize is presented.
- The prize in each category consists of a medal, and a large sum of money. In 2018 the prize amount is nine million Swedish kronor, about a million US dollars.
- The Nobel Prize Award Ceremony is held at the Stockholm Concert Hall for all categories except the Peace Prize, which is awarded in Oslo, Norway.
- After the actual award ceremony, there is an elegant banquet in each city to honour the new Nobel Laureates.

