

## Speaker's manuscript – All Nobel Prizes 2020

### 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 2020

- 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 Economic Sciences Prize is awarded at the same time as the Nobel Prize, as part of the same ceremony on 10 December every year.



### The 2020 Nobel Laureates

- The Nobel Prizes are announced at the beginning of October every year. In 2020, one organisation and 11 men and women were awarded a Nobel Prize.

Let's take a closer look at the achievements of the 2020 Nobel Laureates and how they have benefitted humankind.



### 2020 Physics Prize

- One half of the prize is about theoretical predications about black holes. The other half is about the discovery of a giant black hole.



## The 2020 Physics Laureates

- Roger Penrose tried to answer the question of whether black holes could really be formed. In 1964 he proposed a pivotal mathematical tool called "trapped surfaces" to describe black holes.
- Penrose's mathematical methods demonstrated that Einstein's general theory of relativity does in fact lead to the formation of black holes.
- The other half of the prize has been awarded to Reinhard Genzel and Andrea Ghez, who have made pivotal contributions to the discovery of an invisible but incredibly heavy object at the centre of our galaxy, the Milky Way – an object that must be a black hole.



## Black holes

- The image is from 2019 and is the first to show a black hole.
- Black holes are incredibly heavy and compact objects. If the planet Earth was as compact as a black hole, it would be just 9 millimetres in diameter.
- The gravitational pull from a black hole is so powerful that nothing - not even light - can escape from it.
- In a black hole, space and time are completely different from the way we perceive them here on earth.
- It's hard to see any direct benefit of these discoveries about black holes, but they do stimulate our thinking and wondering about our vast universe and what secrets might be hiding out there.



## 2020 Chemistry Prize

- The 2020 Nobel Prize in Chemistry is awarded for the discovery of one of gene technology's sharpest tools:
- Researchers can use these scissors to change the DNA of living organisms, which has been a great benefit to basic research about how genes work.
- The technology can also be used in the development of food crops, for example, and can lead to innovative medical treatments.



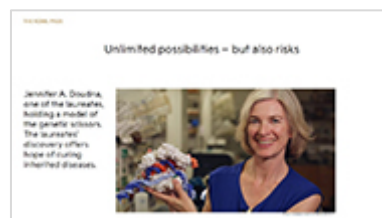
## The 2020 Chemistry Laureates

- Emmanuelle Charpentier and Jennifer A. Doudna started exploring the immune system of *Streptococcus* bacteria. They thought they might be able to develop a new form of antibiotic.
- Instead, they discovered that the bacteria have a clever way of fighting viruses. Just like people, bacteria can be infected by viruses, so they need a way to defend themselves.
- The two researchers realised that the bacteria's clever genetic scissors could be used to make changes to the genetic code - that is, the genome - of other living organisms besides bacteria.
- In 2012, they made the discovery for which the Nobel Prize is awarded and which would soon revolutionise research on how life works.



## Unlimited possibilities – but also risks

- The only limit to how the genetic scissors can be used is our imagination. But there are also risks that the technology could be misused.
- For many years now there have been laws and regulations that determine how gene technology may be used, such as forbidding changes to the human genome that can be inherited by following generations.



## The 2020 Medicine Prize

- The 2020 Nobel Prize in Physiology or Medicine is awarded for the discovery of a completely new virus that causes the disease hepatitis.
- What is hepatitis? Hepatitis is an inflammation of the liver.
- This inflammation is caused primarily by a virus and leads to chronic liver damage and cancer in people all over the world.
- More than a million people die of hepatitis every year, which is about as many as die of tuberculosis and HIV infection.



## The 2020 Medicine Laureates

- The 2020 Nobel Laureates made their Nobel Prize-awarded research contributions from the early 1970s through the late 1990s.
- The work of each researcher built upon the work the others had done, and together they made it possible for us today to detect and treat infections caused by the hepatitis C virus.



## For the benefit of humankind

- The Nobel Laureates' discoveries have led to the development of sensitive blood tests that have eliminated the risk of infection through blood transfusion.
- The discoveries have made possible the development of effective medications that can cure a chronic hepatitis C infection.
- Around the world, however, some challenges remain, such as identifying people who are carrying the virus and giving patients in all parts of the world access to the medications, which are often very expensive.



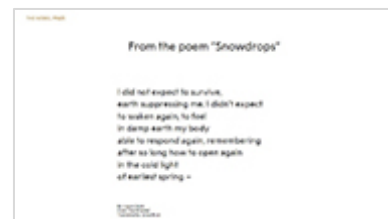
## 2020 Literature Prize

- Louise Glück is considered by many to be one of the most important poets in American Literature today.
- She has published twelve collections of poetry and some volumes of essays on poetry.



## From the poem "Snowdrops"

- The poems in the collection *The Wild Iris* are set in a garden. It is a work in three parts in which three different voices are heard: the garden's flowers as they speak to a gardener and poet, the gardener/poet herself, and finally an omniscient deity.
- In *The Wild Iris*, Glück shows that her poems are about not only sadness but also renewal and rebirth. In the poem "Snowdrops", she describes the miraculous return of life after winter.
- I did not expect to survive,  
earth suppressing me. I didn't expect  
to waken again, to feel  
in damp earth my body  
able to respond again, remembering  
after so long how to open again  
in the cold light  
of earliest spring –



## Straightforward and deep at the same time

- Louise Glück is revered for her linguistic precision and for how she engages with exquisite sensitivity in timeless topics such as isolation, family relationships, divorce and the development of the soul in confronting death.
- There are often moments of humour and biting wit in her poems.
- When asked which of her books one should start with if interested in getting to know her work, Louise Glück recommends *Averno*.



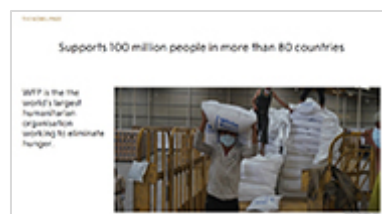
## 2020 Peace Laureate

- The 2020 Nobel Peace Prize is awarded to the United Nations' World Food Programme (WFP).
- The WFP is awarded the prize for its efforts to combat hunger and starvation throughout the world, but also for its contribution to bettering conditions for peace in conflict-affected areas. The organisation is a driving force in efforts to prevent the use of hunger as a weapon of war and conflict.



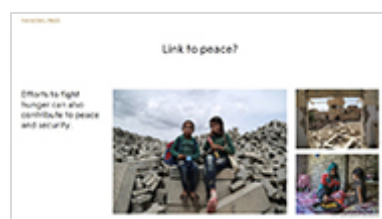
## Supports 100 million people in more than 80 countries

- The World Food Programme is a branch of the United Nations and was founded in 1961.
- It is the world's leading humanitarian organisation working to eliminate hunger and achieve food security. In 2019, the organisation supported almost 100 million people in 88 countries. The WFP works to supply food to people who are living in areas that are affected by conflict or have been struck by natural disasters.
- Two-thirds of the organisation's efforts target conflict-affected countries.



## Link to peace?

- There is a powerful connection between starvation and armed conflict. War and conflict can cause food insecurity and hunger, while food insecurity and hunger can in turn precipitate armed conflicts. This creates a vicious circle.
- Therefore we will never achieve the goal of zero hunger unless we also put an end to war and armed conflict.
- The humanitarian work WFP is doing doesn't just combat hunger and starvation; it can also contribute to peace and security.



## The 2020 Economic Sciences Prize

- An auction is a way to sell something through bidding. What's being sold can be an object of some sort, but even homes can be sold through bidding. Municipal contracts, such as waste collection services for a particular area, may also be awarded by auction.
- The Economic Sciences Laureates have clarified how auctions work and why bidders act as they do. They have studied various bidding strategies to determine which is the best way to avoid paying too much and getting a bad deal. The laureates have also invented new and better auction formats that make auctions of public goods and services result in better outcomes for taxpayers.



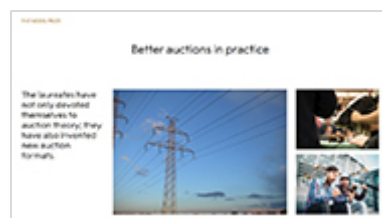
## 2020 Economic Sciences Laureates

- The 2020 Prize in Economic Sciences is awarded to Robert B. Wilson and Paul R. Milgrom. They both work at Stanford University in California, USA.
- The two laureates have both developed theories of auctions and have themselves used their research results in practical applications that have spread all over the world.



## Better auctions in practice

- In the 1990s, wireless communication became increasingly common. Wireless communication uses radio frequencies that are owned by the government.
- Private mobile operators wanted to use the same kind of frequencies used by radio stations.
- It turned out to be difficult to find a fair way to sell licenses for these frequencies.
- The two laureates came up with a way to auction off the frequencies that maximises the income for the government, which is very good for taxpayers.
- The laureates' research on how auctions work laid the groundwork for the new auction formats they developed together. Today these new formats are used in a number of different areas, including the trading of emission allowances and electricity markets.



## The awarding of the Nobel Prize

- The Nobel Prize Award Ceremony is held at the Stockholm Concert Hall, Sweden, for all categories except the Peace Prize, which is awarded in Oslo, Norway.

