

THE
NOBEL
PRIZE

ALL NOBEL PRIZES 2018

Nobel Prize Lessons

The Nobel Prize

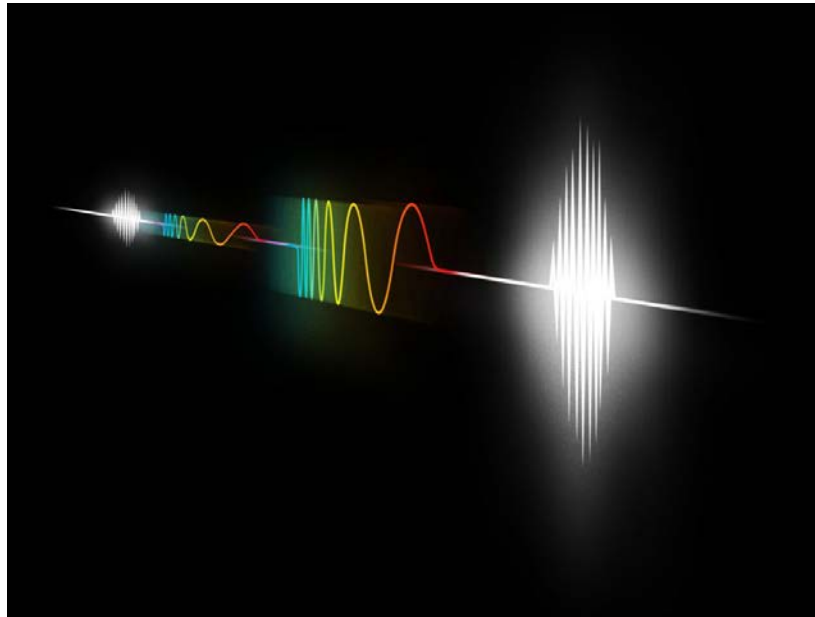
Since 1901

To those who, during the preceding year, shall have conferred the greatest benefit to humankind.

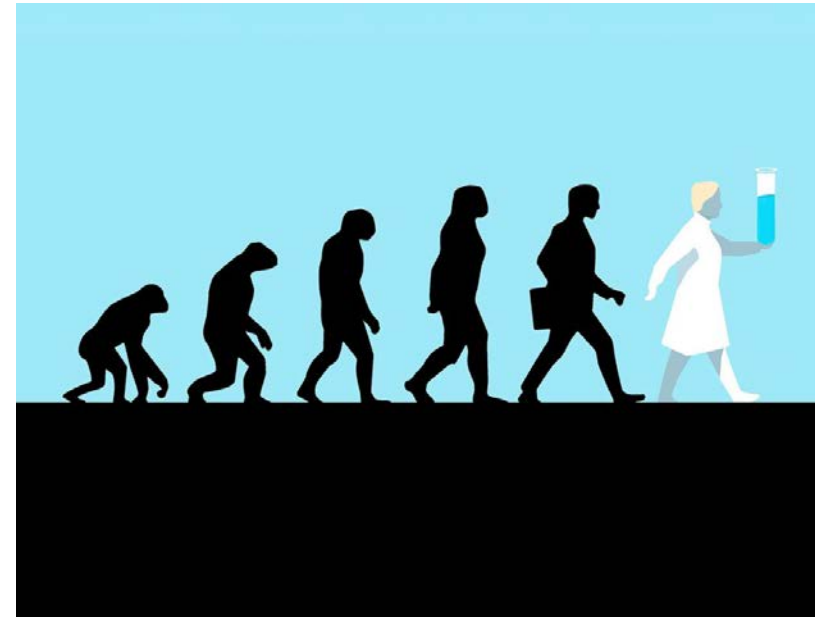
Alfred Nobel (1833-1896)



The Nobel Prizes 2018



Physics Prize: tools made of light



Chemistry Prize: production of new enzymes and antibodies



Medicine Prize: cancer treatment



Literature Prize: not awarded in 2018



Peace Prize: combating war crimes



Prize in Economic Sciences: Integrating nature and knowledge into economics

Physics Prize 2018

A tool for using laser light to capture and manipulate particles, and a method for creating very strong, rapid laser pulses.



Arthur Ashkin
Born: 1922, USA



Gérard Mourou
Born: 1944, France



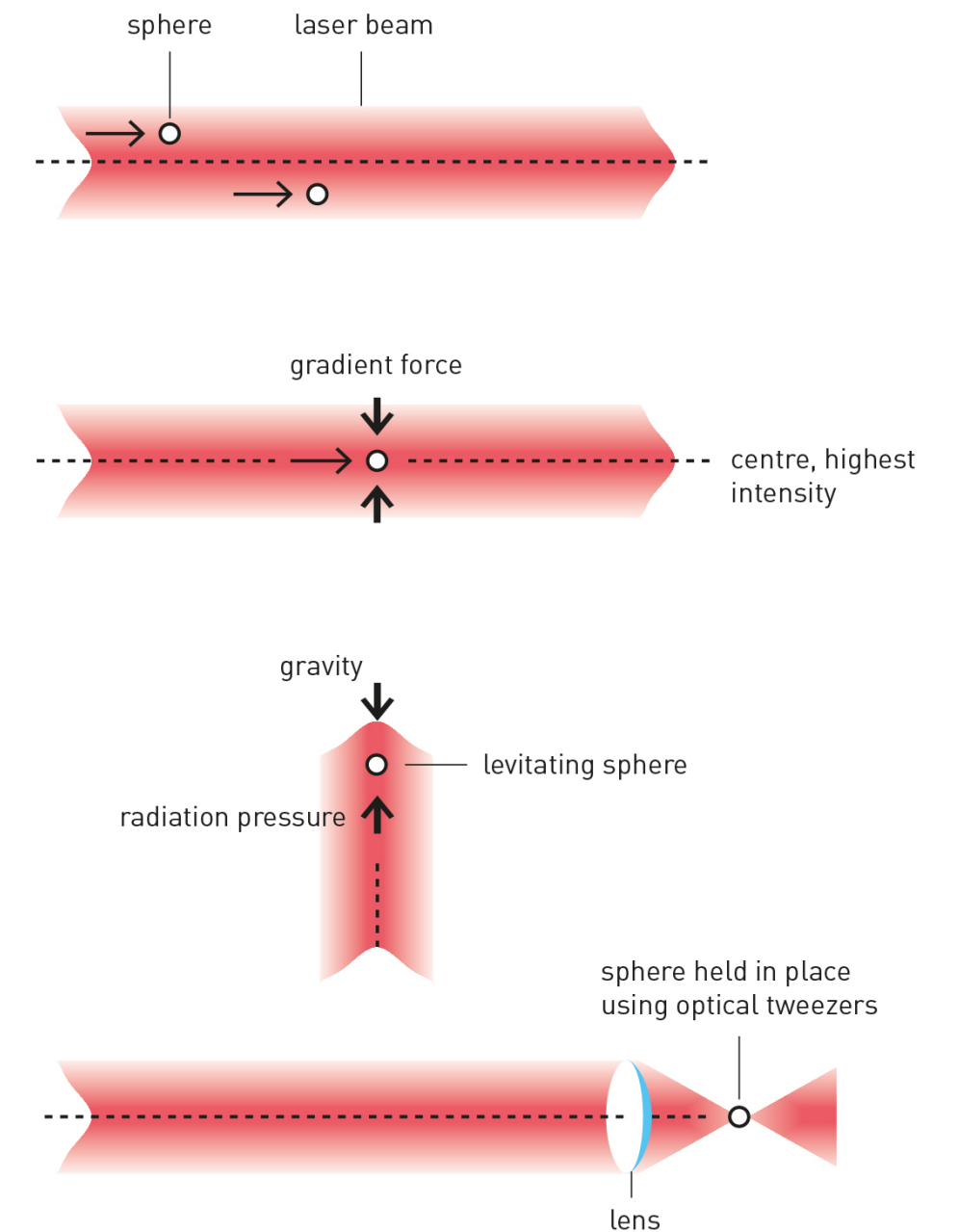
Donna Strickland
Born: 1959, Canada

Optical tweezers

Using a laser beam to move and capture objects.

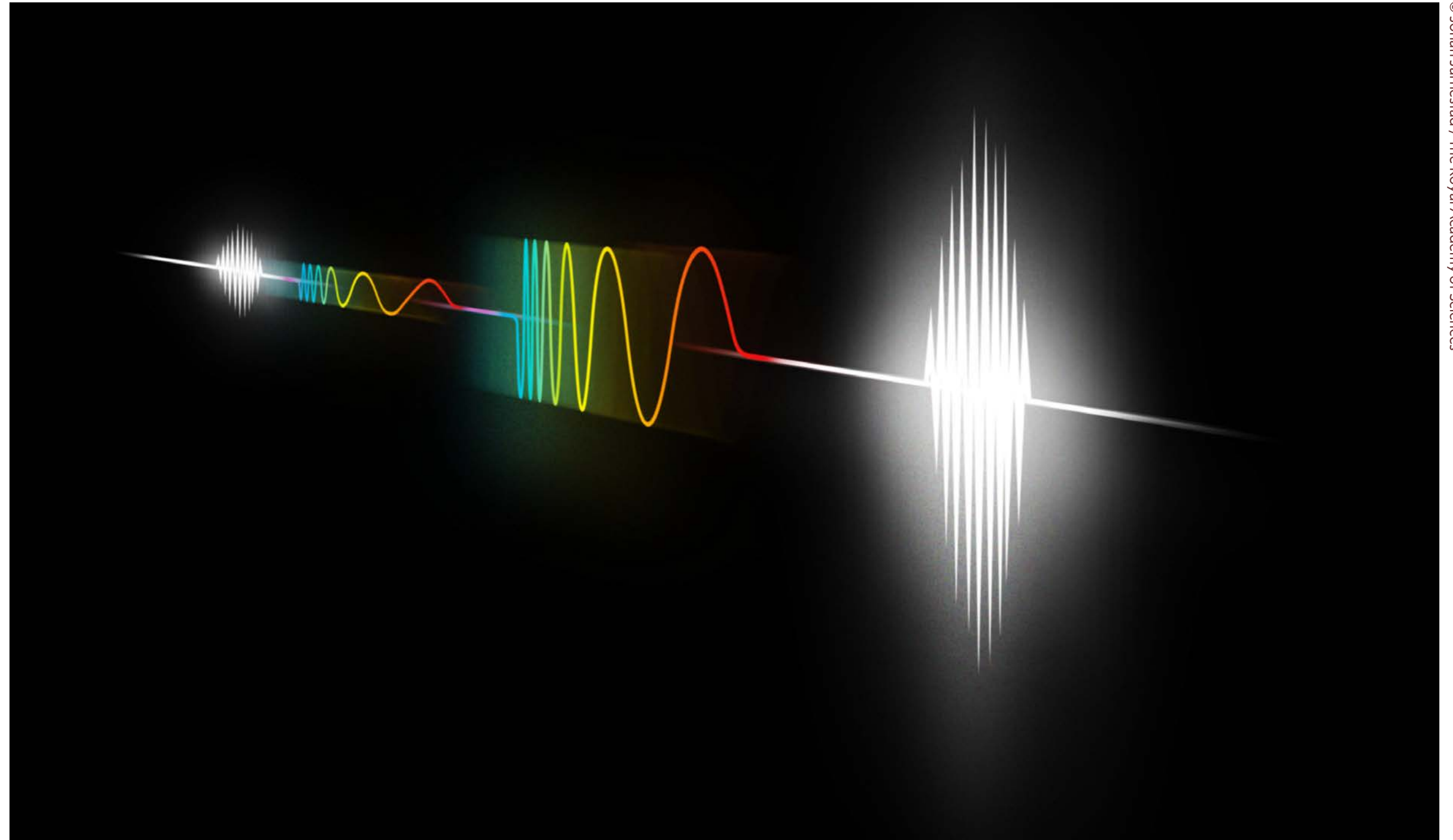
Ashkin creates his light trap

- 1 Small transparent spheres are set in motion when they are illuminated with laser light. Their speed corresponds to Ashkin's theoretical estimation, demonstrating that it really is radiation pressure pushing them.
- 2 One unexpected effect was the gradient force that pushes the spheres towards the centre of the beam, where the light is most intense. This is because the intensity of the beam decreases outwards and the sum of all the forces pushing the spheres sends them towards its centre.
- 3 Ashkin makes the spheres levitate by pointing the laser beam upwards. The radiation pressure counteracts gravity.
- 4 The laser beam is focused with a lens. The light captures particles and even live bacteria and cells in these optical tweezers.



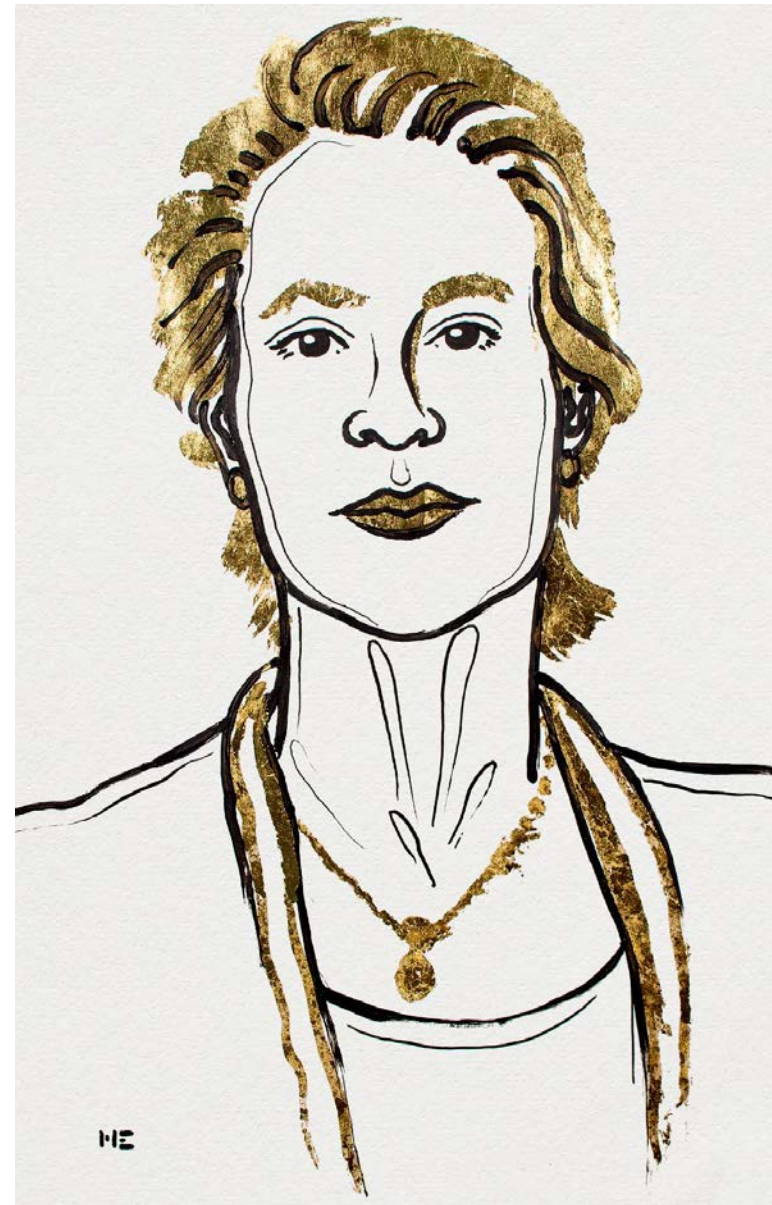
Speeding up pulsing laser light

A short, intensive pulse is stretched, amplified and then compressed, forming a short and much more intensive pulse.



Chemistry Prize 2018

Methods for producing
useful new enzymes and
antibodies.



Frances H. Arnold
Born: 1956, USA



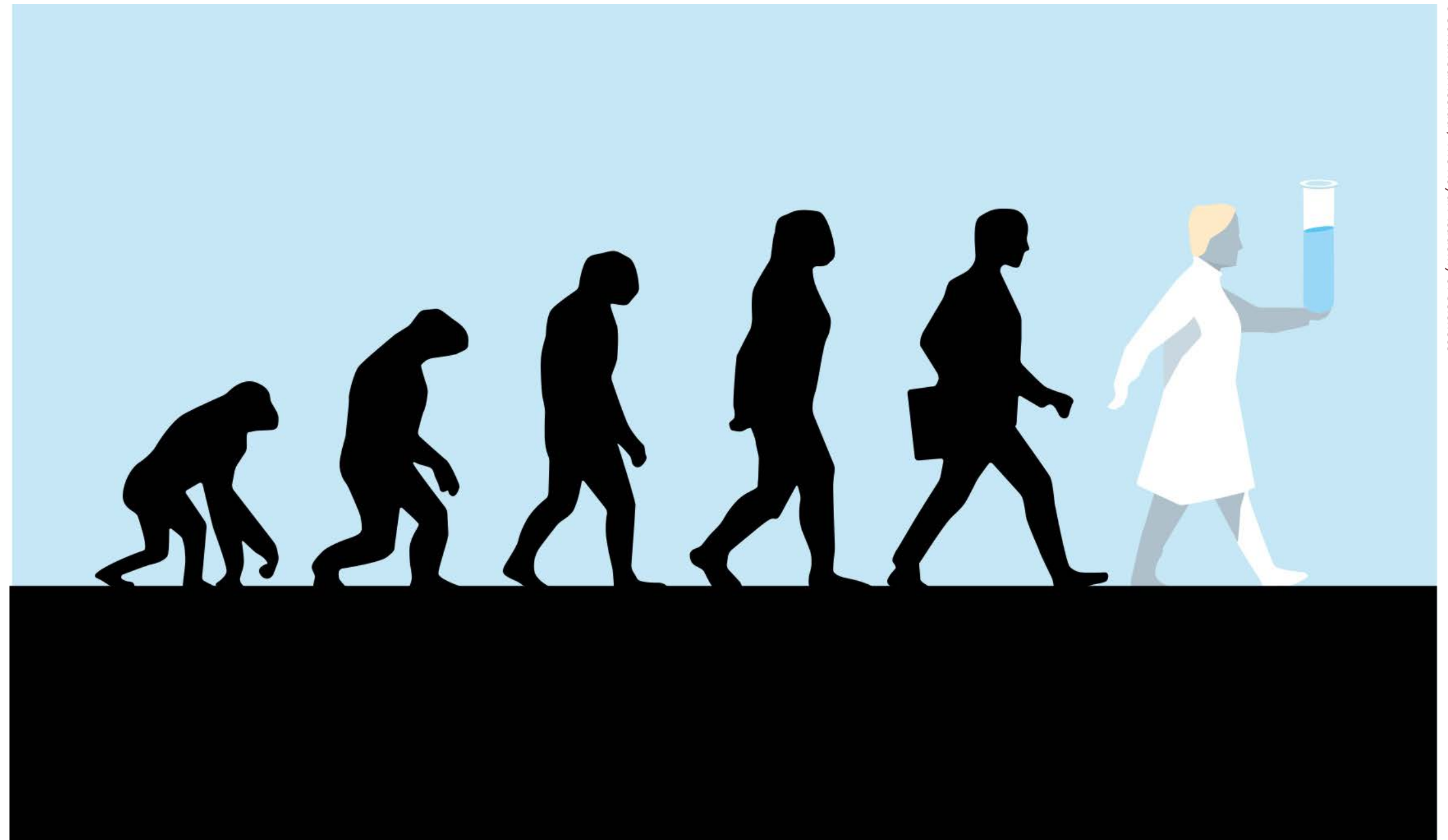
George P. Smith
Born: 1941, USA



Sir Gregory P. Winter
Born: 1951, United Kingdom

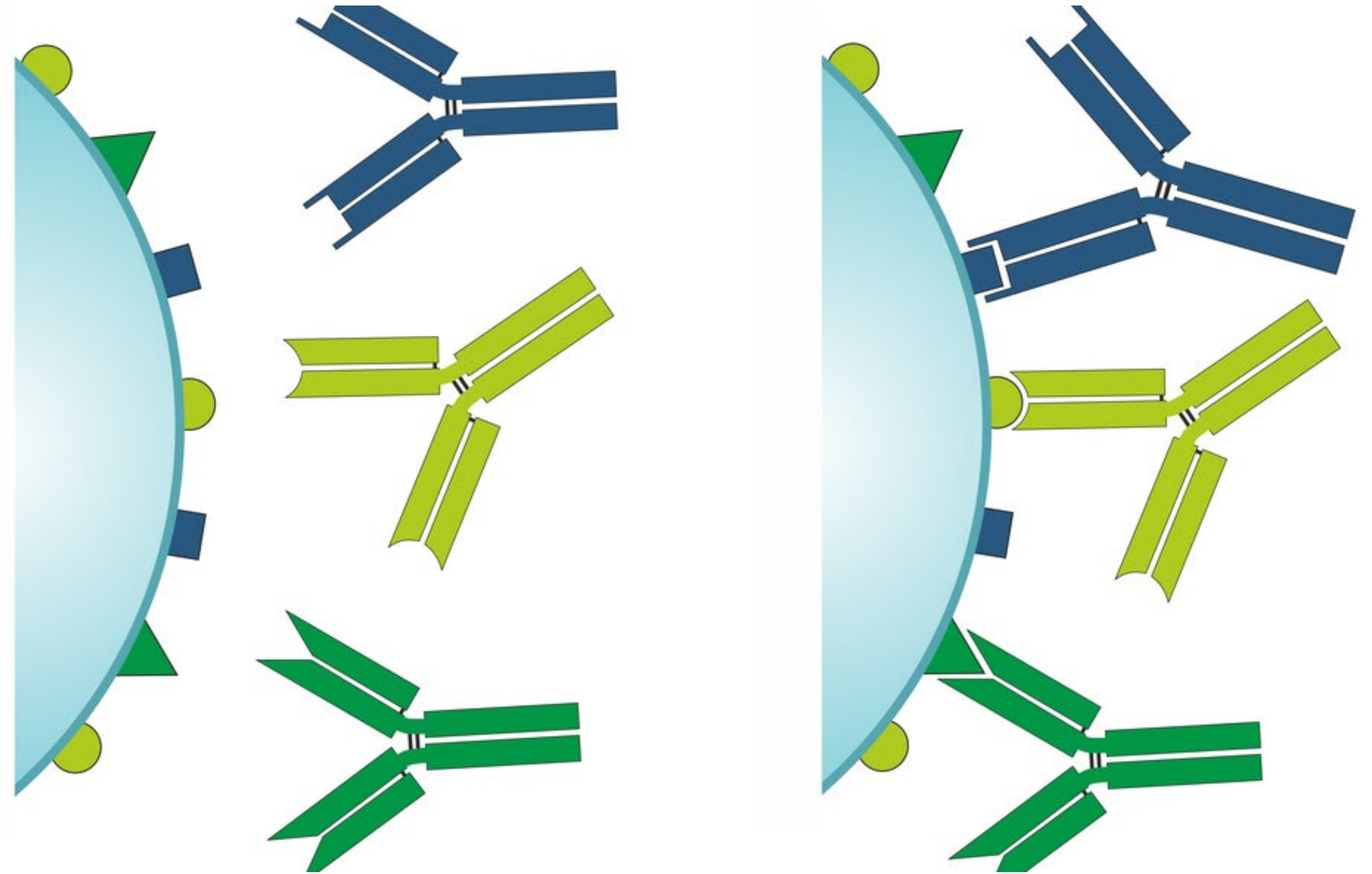
Directed evolution of enzymes

Enzymes developed by means of directed evolution are used in making everything from biofuel to pharmaceuticals.



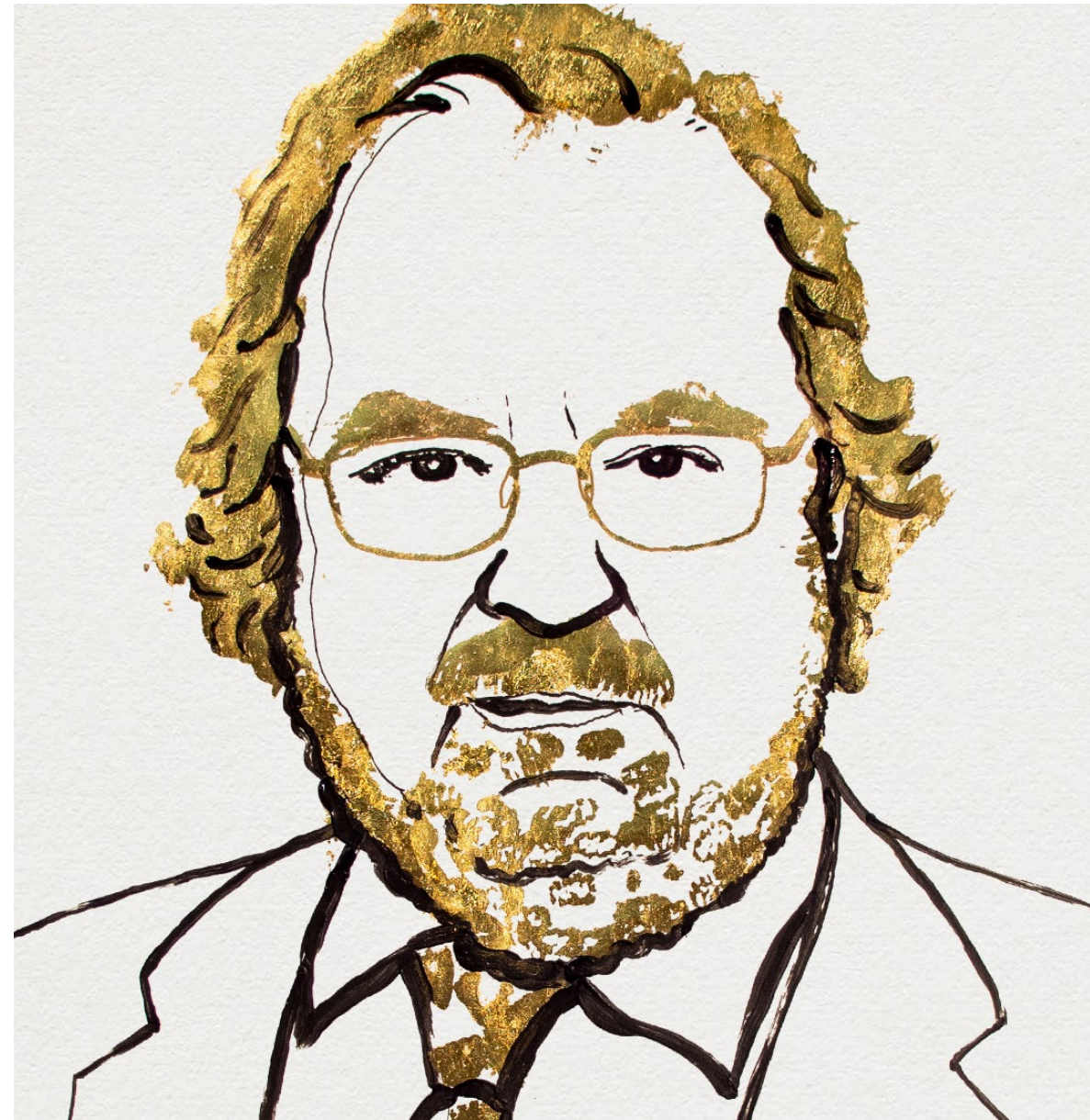
Antibodies as medicines

Antibodies can be produced by means of directed evolution. These antibodies can be used as pharmaceuticals that combat certain diseases.

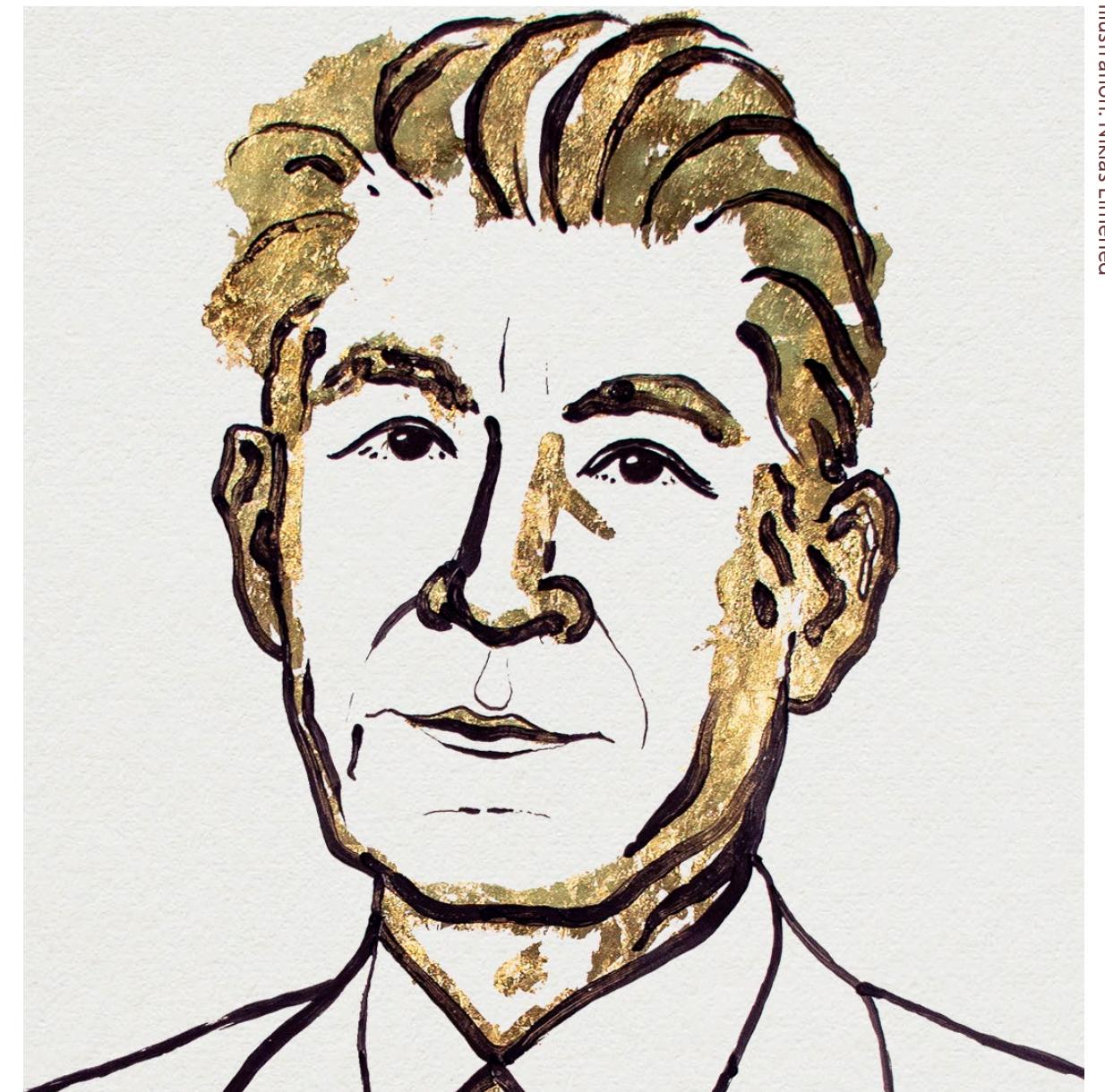


Medicine Prize 2018

This year's Laureates discovered and developed a new method for curing cancer.



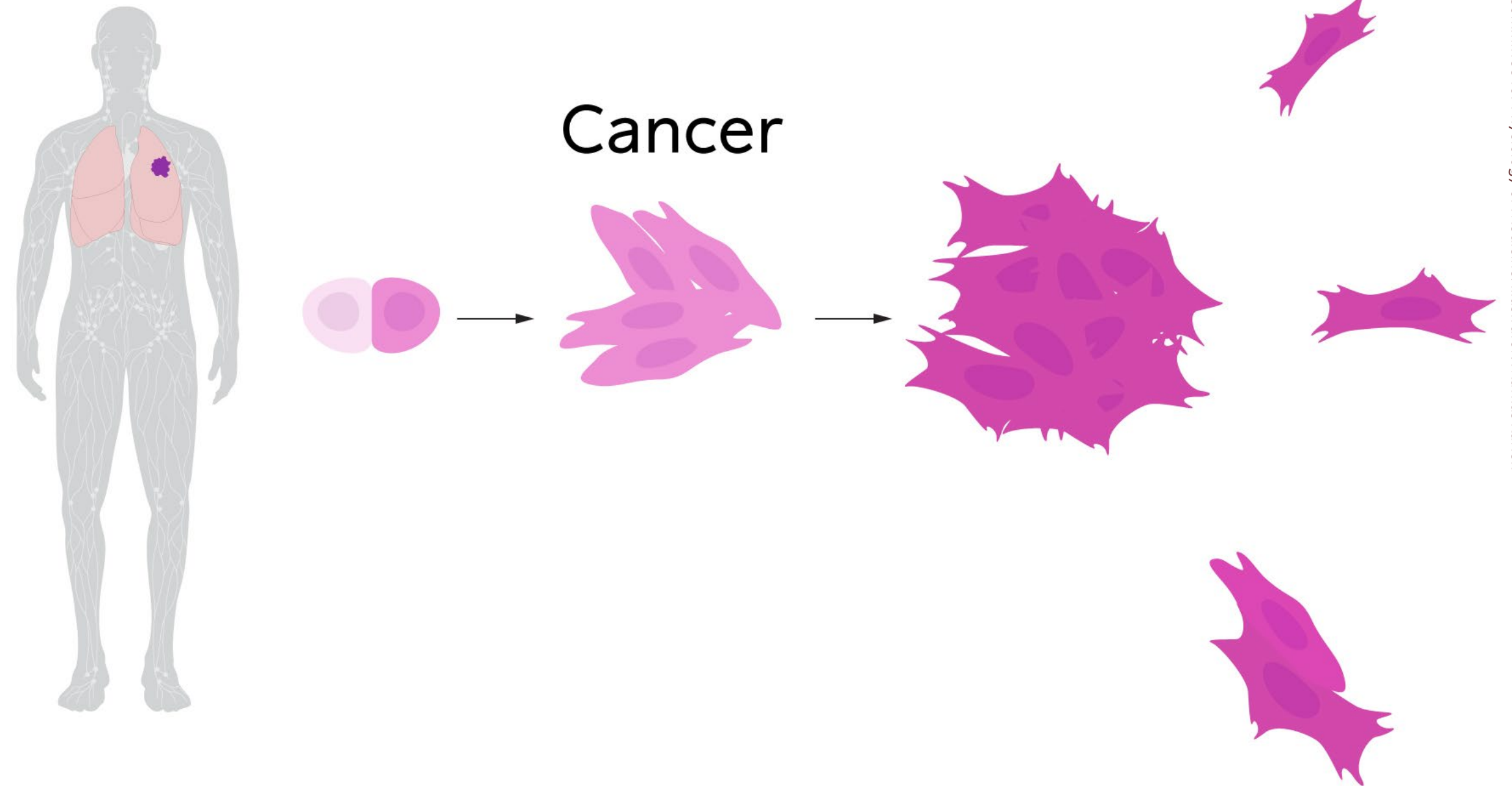
James P. Allison
Born: 1948, USA



Tasuku Honjo
Born: 1942, Japan

Cancer

Cancer cells divide uncontrollably and form tumours.



Immune checkpoint therapy

Treatment of cancer by releasing the brakes in our immune system.



Peace Prize 2018

“for their efforts to end the use of sexual violence as a weapon of war and armed conflict”



Denis Mukwege
Born: 1955, DR Congo



Nadia Murad
Born: 1993, Iraq

Denis Mukwege

Many years of work – at the risk of his own life.



Nadia Murad

She was a prisoner of Islamic State – today she is fighting to help others.



Photo: State Department, Public Domain

Prize in Economic Sciences 2018

Integrating nature and knowledge into economics



William D. Nordhaus
Born: 1941, USA



Paul M. Romer
Born: 1951, USA

The market and technological change

Monopolies and technological changes that harm nature can be controlled with the help of regulations that lead to sustainable growth.



Climate change and the economy

Depending on what choices we make, the consequences on the climate will vary.



Awarding the Nobel Prize

On December 10 each year, the Nobel Prize is presented.



THE
NOBEL
PRIZE

FOR THE GREATEST BENEFIT TO HUMANKIND

Nobel Prize Lessons