Nobelförsamlingen
The Nobel Assembly at Karolinska Institutet

PRESS RELEASE

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The 2026 Nobel Prize in Physiology or Medicine

The Nobel Assembly at Karolinska Institutet has decided to award the 2026 Nobel Prize in Physiology or Medicine jointly to

KARL DEISSEROTH
The Howard Hughes Medical Institute and Stanford University, USA

PETER HEGEMANN
Humboldt University of Berlin, Germany

GEORG NAGEL
University of Würzburg, Germany

"for their discoveries concerning light-gated ion channels and optogenetics"

Light-seeking algae gave us a switch for nerve cells

The Nobel Prize in Physiology or Medicine 2026 is awarded for optogenetics — a method that makes it possible to show how nerve cells shape memories, feelings and behaviours in the living brain. Peter Hegemann and Georg Nagel discovered a remarkable protein, *channelrhodopsin*, in a single-celled alga. Karl Deisseroth transformed the protein into a light-controlled switch for nerve cells. The Laureates have laid the foundation of a new era in neuroscience.

How the brain governs feelings, behaviours and bodily functions has long been a mystery. In the 20th century, researchers began to investigate which areas of the brain affect which functions, but the methods used meant they could not prove causal relationships. The image they developed of the brain was like a sketch map, full of question marks and unknowns. Now all this is changing.

"Optogenetics provides opportunities for mapping the brain in a way that we could once only dream of", says Per Svenningsson, Chair of the Nobel Committee for Physiology or Medicine.

It all began with Peter Hegemann's curiosity. He wondered how *Chlamydomonas*, a single-celled alga, is able to swim towards a light source. In the early 2000s, he and Georg Nagel discovered channelrhodopsin, an algal protein with unique properties, found on the surface of the cell. When it is illuminated by blue light, a channel opens through the protein. Charged ions then flow into the cell, creating an electrical impulse. They found that regardless of which cell they put the protein in, those cells became light sensitive.

Karl Deisseroth introduced the gene for channelrhodopsin into nerve cells from rats. By illuminating the cells with blue light, he was able to trigger a nerve signal. He published this breakthrough in 2005. Two years later, he made this light-controlled switch for nerve cells work in the brains of living mice.

This method for controlling nerve signals with light is now called optogenetics, and it has rapidly gained global impact. Using optogenetics, researchers have been able to reveal neural circuits governing specific memories, feelings, and behaviours relevant for neurological and psychiatric disorders. In clinical medicine, researchers are using the method in attempts to restore sight in people with visual impairment.

Optogenetics has fundamentally altered our understanding of the brain. Every day brings new discoveries, helping to solve one of humanity's great mysteries: how our incredible brain works.

Karl Deisseroth, born 1971. Ph.D. 1998 and MD 2000 from Stanford University, USA. D.H. Chen Professor, Professor of Bioengineering and of Psychiatry and Behavioral Sciences, at the Howard Hughes Medical Institute and Stanford University, USA.

Peter Hegemann, born 1954. Ph.D 1984 at the Max-Planck-Institute for Biochemistry, Martinsried, Germany. Hertie Senior Professor of Neuroscience, Humboldt University of Berlin, Germany. The prize awarded discoveries were made at the Max Planck Institute for Biochemistry, Martinsried, Germany

Georg Nagel, born 1953. Ph.D. 1988 at the University of Frankfurt, Germany. Professor of Molecular Plant Physiology at the Department for Molecular Plant Physiology and Biophysics – Botany I, University of Würzburg, Germany. The prize awarded discoveries were made at Max Planck Institute for Biophysics, Frankfurt, Germany.

Prize amount: 12 million Swedish kronor, to be shared equally between the Laureates.
Further information: nobelprize.org
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The Nobel Assembly, founded 1977, is the body at Karolinska Institutet that awards the Nobel Prize in Physiology or Medicine.

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