STUDY NOTES · BASIC CONCEPT

About Nobel Prize, 2026 Nobel prize in Physiology and What is optogenetics?

Science & Technology

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A. What Are the Nobel Prizes?

The Nobel Prizes were established through the will of Alfred Nobel, a Swedish inventor and industrialist. The first prizes were awarded in 1901.

The original award categories are:

1. Physics
2. Chemistry
3. Physiology or Medicine
4. Literature
5. Peace

The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel was established in 1968 and first awarded in 1969. It is commonly referred to as the Nobel Prize in Economics, although it was not one of the five original prizes established in Nobel's will.

B. Why Are Some Contributors Left Out?

Several factors can explain why a major award does not recognise everyone who contributed to a discovery:

1. Limited number of recipients: A Nobel Prize can be shared by no more than three individuals.
2. Complex research history: Discoveries frequently build on earlier findings and independent contributions.
3. Selection criteria: Award committees must identify contributions that meet the criteria of the particular prize.
4. Interdisciplinary research: Scientific advances may involve researchers from several disciplines.

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5. Collective effort: Laboratories, technicians, institutions and large research teams may all contribute to a breakthrough.
6. Important distinction: Being absent from the list of laureates does not prove that a person was nominated, rejected or unfairly treated.

C. Example from the 2026 Nobel Prize in Physiology or Medicine

The 2026 Nobel Prize in Physiology or Medicine recognised Karl Deisseroth, Peter Hegemann and Georg Nagel for their work on optogenetics. Other researchers, including Ernst Bamberg and Edward Boyden, have also been identified in reporting as contributors to the broader development of the field.

What is optogenetics?

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Optogenetics is a technique that combines genetic methods and light to control the activity of specific cells, particularly neurons.

It has helped researchers investigate how neural circuits function and how brain activity relates to behaviour and disease.

This example illustrates how a Nobel-recognised breakthrough can emerge from a broader scientific ecosystem involving foundational research, methodological innovation and experimental application.

D. Individual Achievement vs Collaborative Research

Individual recognition	Collaborative research
Highlights specific scientific contributions.	Emphasises contributions from multiple researchers.
Can raise the profile of an individual discovery.	Enables complex problems to be addressed using diverse expertise.

Individual recognition	Collaborative research
May simplify a discovery's wider history.	Recognises the interconnected nature of scientific progress.
Can motivate researchers through prestige.	Can strengthen knowledge-sharing and interdisciplinary innovation.

The two approaches are complementary. Recognising individuals need not mean ignoring the broader teams and institutions that make discoveries possible.

E. Why Is Scientific Recognition Important?

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Scientific recognition can:

1. Motivate researchers to pursue difficult problems.
2. Increase public awareness of scientific discoveries.
3. Improve opportunities for research funding and collaboration.
4. Inspire students to pursue careers in science.
5. Help communicate the social and technological importance of research.
6. However, awards are not complete measures of scientific merit. Research quality, reproducibility, long-term impact and contributions to shared knowledge also matter.

F. What Is the Role of Scientific Institutions?

Universities, research laboratories, funding agencies and scientific academies help create the conditions for innovation.

Their responsibilities include:

1. Providing funding and research infrastructure.
2. Supporting early-career researchers.
3. Encouraging interdisciplinary collaboration.
4. Maintaining ethical standards and research integrity.
5. Developing fair systems for evaluating individual and collective contributions.

6. Making scientific knowledge accessible to society.

For India, strengthening research institutions and improving collaboration between universities, industry and government are important for building a robust research ecosystem.

G. Important Concept: Open Science

Open science promotes greater accessibility, transparency and collaboration in research, subject to legitimate privacy, security and intellectual-property restrictions.

It may include open-access publications, sharing research data where appropriate, reproducible methods and collaborative scientific platforms.

Relevance: Open science can help researchers build on one another's work, verify findings and make scientific progress less dependent on isolated institutions or individuals.

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Relevance for UPSC

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- GS Paper III: Science and technology, research and development, and innovation.
- GS Paper IV: Ethics in research, fairness, recognition and professional integrity.
- Essay: Individual achievement versus collective effort; the role of science in human progress.
- International Relations: Global scientific collaboration and knowledge-sharing.