



## Academia Europaea The Academy of Europe



The Academia Europaea are pleased to award an Erasmus Medal to the internationally renowned Neuroscientist

### Professor Jean-Pierre Changeux MAE

*The Erasmus Medal of the Academia Europaea, is awarded to a European scholar who has maintained over a sustained period of time an outstanding level of international scholarship as recognised by peers. It is perhaps the highest recognition for purely scholarly achievements that the Academy can bestow on a scholar. The Medal is awarded at the Annual Conference of the Academy and on that occasion the recipient will give the Annual Erasmus Lecture.*

Professor Changeux will receive the medal and will deliver the accompanying Academia Europaea - Heinz-Nixdorf Erasmus Lecture at the annual conference of the Academia Europaea, Munich, on October 9 - 11, 2023.

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#### Erasmus Medal Citation

Jean-Pierre Changeux has been the leader in the field of receptor research and neuroscience for the past half a century. His thorough dissection of the nicotinic acetylcholine receptors is a landmark in modern biology. The extension of the allosteric theory to membrane proteins provided a mechanistic explanation for the process of signal transduction by ligands. It has vast implications in several fields of biology, including receptor biology, cellular communications, drug design and development, and neuroscience. Due to his pioneering and seminal activities, Changeux is one of the key founders of modern molecular pharmacology and neuroscience.

As a graduate student in the laboratories of Nobel Laureates Jacques Monod and François Jacob, Changeux's studies provided a fundamental mechanism of protein regulation, the allostery model,

with a profound impact on the biology of living organisms. He further proposed that allosteric regulation in membrane receptors plays a key role in the transmission of chemical signals in the nervous system. He hypothesized that the acetylcholine receptor could be envisioned as a membrane macromolecule in which the acetylcholine binding site regulates by an allosteric conformational change, the gating of an ion channel. His subsequent career strategically and comprehensively validated this pioneering insight, resulting in a series of important discoveries.

Changeux's seminal work on the nicotinic receptor forged new fields of research in signal transduction mechanisms, molecular pharmacology, and pathological modifications of chemical communications in the nervous system, including the subsequent molecular identification of brain ionotropic glutamate and GABA receptors. Following Changeux's pioneering work, the notion that receptor activity is controlled by allosteric mechanisms has been extended to G protein-coupled receptors and growth-factor receptors. It is now well-established that ligand binding triggers an allosteric transition that activate or inhibit the G proteins or activate receptor tyrosine kinases.

Subsequently, Changeux used his knowledge of the nicotinic receptors to investigate higher levels of brain organization, in particular the way these receptors participate in reward and cognition. Moving from the molecules and the isolated neurons or muscle cells to the development of neuronal networks, Jean-Pierre Changeux made an outreaching contribution by proposing the theory that long-term epigenesis of neuronal networks occurs by the selective stabilization and elimination of developing synapses. In parallel, he proposed, with his collaborators, theoretical models for defined cognitive tasks that bridge the gap between molecular biology and cognitive science. In these models, allosteric receptors play a key role in the regulation of synaptic efficacy. Changeux and his colleagues further proposed an original hypothesis describing a neuronal mechanism for conscious access, implicating a "global neuronal workspace" composed of a brain-scale horizontal network of reciprocally connected long axon pyramidal neurons.

Finally, throughout his career, Jean-Pierre Changeux has been concerned by the ethical consequences of neuroscience for medicine and for society in general. He has written a number of books, including the iconic "L'homme neuronal", which not only reveals his status as a leading contemporary figure in neuroscience but also one of the leading thinkers of our times and a worthy contemporary heir of the French Encyclopaedists of the 18<sup>th</sup> century.

Based on his distinguished scientific achievements, his contributions to European scientific culture and his commitment to Academia Europaea as one of its founding members (membership number: 63), Academia Europaea is pleased and honoured to award the 2022 Academia Europaea Erasmus Medal to Professor Jean-Pierre Changeux.

General biography

See: [https://www.ae-info.org/ae/Member/Changeux\\_Jean-Pierre](https://www.ae-info.org/ae/Member/Changeux_Jean-Pierre)

And also: <https://research.pasteur.fr/en/member/jean-pierre-changeux/>

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### Short synopsis

Professor Changeux was elected to the Academia Europaea in 1988 and is one of the founder members.

#### **1) Academic training**

Ecole Normale Supérieure (rue d'Ulm, Paris) (1955) and Licence de Sciences Naturelles (1956, 1957) at Paris University. Diplôme d'Etudes Supérieures (Mention Très Bien et Félicitations du Jury) (1958). Agrégé des Sciences Naturelles (received first) (1958). Doctorat d'Etat de Sciences Naturelles, Paris (Mention Très Honorable et Félicitations du Jury), under the supervision of Pr. Jacques Monod, Institut Pasteur (1964).

## **2) Academic positions**

Agrégé-préparateur of Zoology, Ecole Normale Supérieure, 1958 ; Postdoctoral fellow, University of California, Berkeley, 1965-1966 (with J Gerhart & H Schachman); visiting Assistant Professor Columbia University College of Physicians & Surgeons, New-York (with D Nachmansohn), 1966-1967 ; Sous-Directeur, Collège de France, Paris (Chaire de Biologie Moléculaire), 1967 ; Director of the Unit of Molecular Neurobiology, Institut Pasteur, Paris, 1972-2006 ; Professor Collège de France, 1975-2006 ; Professor Institut Pasteur, 1975-2006, emeritus since 2007 ; Skaggs distinguished visiting professor in Pharmacology, University of California San Diego 2008-2012 (with P Taylor) ; International Faculty, Kavli Institute for Brain & Mind, University of California San Diego 2012-2022 (with R Greenspan).

## **3) Scientific prizes and awards**

Gairdner Foundation International Award, "In recognition of his pioneering work in purifying and elucidating the mechanisms of the cholinergic receptor." Toronto, Canada, 1978.

Richard Lounsbery Prize, National Academy of Sciences, Washington (USA) and Académie des Sciences, Paris, 1983.

Wolf Foundation Prize in Medicine, for "the isolation, purification and characterization of the acetylcholine receptor". Jerusalem, Israel, 1983.

Prix Broquette-Gonin, Académie Française, for "l'Homme Neuronal", 1983 (nomination by Claude Levi-Strauss).

F.O. Schmitt medal and prize, Neuroscience Research Program, Rockefeller University, New York, 1986.

Rita Levi-Montalcini Award, Fidia Research Foundation, Washington, 1988.

Bristol-Myers-Squibb Award in Neuroscience, New York, 1990.

Carl-Gustaf Bernhard medal, Swedish Royal Academy of Sciences, Stockholm, 1991.

Science for Art, Prix d'Honneur LVMH, Paris, 1992.

Médaille d'Or, Centre National de la Recherche Scientifique, Paris, 1992.

Louis Jeantet Prize for Medicine, for "his work in structural biology", Geneva, 1993.

Thudichum medal, Biochemical Society, London 1993.

Goodman and Gilman Award in drug receptor pharmacology, American Society for Pharmacology and Experimental Therapeutics, Anaheim, California, 1994.

Camillo Golgi medal, Accademia Nazionale dei Lincei, Rome 1994.

Sir Hans Krebs medal, FEBS, Helsinki, 1994; Max-Delbrück medal, in Molecular Medicine, Berlin, 1996.

Grand Prix de la Fondation pour la Recherche Médicale, Paris, 1997 ;

Linus Pauling medal, 1998/1999, Stanford, USA.

Eli Lilly award in preclinical Neuroscience, European College of Neuropsychopharmacology, London, 1999.

Balzan Prize for Cognitive Neuroscience, for "establishing a new direction for the study of cognitive functions by rooting them at the molecular level". Berne, 2001.

American Philosophical Society's Karl Spencer Lashley Award in neuroscience, "In recognition of his pioneering, comprehensive studies into the fundamental molecular mechanisms underlying interneuronal communication and their role in network formation, learning, and reward" Philadelphia, 2002.

Lewis Thomas Prize for Writing about Science, Rockefeller University, New-York, 2005.

Golden Eurydice Award from International Forum of Biophilosophy, Bruxelles, 2006.

National Academy of Sciences Award in the Neurosciences USA, for "his seminal discoveries elucidating cellular and molecular bases for synaptic plasticity in the brain", Washington, 2007.

Neuronal plasticity prize, IPSEN Foundation, Geneva, 2008.

Japanese Society for the Promotion of Science Award for Eminent Scientists, Tokyo, 2012.

Italian Society for Neuroethics Award Medal, Padova, 2015.

The Olav Thon international research award in biomedicine, to "honour a researcher who has connected a deep understanding of molecules and their regulation to new insights into the functions and diseases of the brain". Oslo, Norway, 2016.

Albert Einstein World Award of Science, for "exceptional scientific achievements and leadership in the field of neuroscience and especially for his pioneering contributions to the science and understanding of neuroreceptors for the past 50 years". Hong Kong, 2018.

Goldman-Rakic Prize for “Outstanding Achievements in Cognitive Neuroscience”, New-York, & Yale 2018.

Elevated Lead scientist of the Human Brain program SGA3, Brussels-Lausanne 2020.

Clarivate citation laureate in Physiology or medicine 2021, London.

Number of papers: 675

Sum of the Times Cited: 108 925

h-index: 164

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*Press enquiries to The Executive Secretary at AE HQ, London*

*The Erasmus Medal is the highest Award that the Academia Europaea can bestow. It recognises an individual's substantial life-long scholarly achievement. The prize carries no financial benefit and is open to nominations of candidates who are members and non-members. Non-members also receive the honour of immediate election to the Academy.*

*Information about the Erasmus medal and a list of past winners can be found on our website at [www.ae-info.org](http://www.ae-info.org) (specific URL at: [https://www.ae-info.org/ae/Acad\\_Main/Activities/Awards\\_and\\_Prizes/Erasmus\\_Medal](https://www.ae-info.org/ae/Acad_Main/Activities/Awards_and_Prizes/Erasmus_Medal) )*

The Award and lecture is sponsored by the Heinz-Nixdorf Stiftung



1. Heinz Nixdorf Stiftung is - together with Stiftung Westfalen - one of two non profit foundations, which have been established from the assets of the estate of the entrepreneur Heinz Nixdorf, who died in 1986. The foundation promotes the following purposes:
  - a) the (advanced) professional education, especially in the field of modern technology,
  - b) the sciences in respect of research and teaching, especially in the field of information technology,
  - c) the liberal and democratic governmental system, especially the „Soziale Marktwirtschaft“,
  - d) public health,
  - e) sports.

The foundation realizes its purposes primarily in cooperation with other non profit institutions.

2. Heinz Nixdorf Stiftung promotes among others the Heinz Nixdorf MuseumsForum in Paderborn. This is a non profit institution combining in a unique way the classic historic dimension of a museum with the current and future-oriented topics of a forum.

Heinz Nixdorf MuseumsForum is the largest computer museum of the world.

Further information about the Heinz-Nixdorf Stiftung can be found at:

<http://www.heinz-nixdorf-stiftung.de>