Winner's Achievements

Professor Jean-Pierre Changeux

At the beginning of his career in the 1960s, working with Jacques Monod, François Jacob and Jeffries Wyman, Jean-Pierre Changeux made a breakthrough that led to the development of the theory of allosteric transitions in proteins. This now well-established concept postulated that regulatory ligands control the activity of the active sites of enzymes when they bind to topologically distinct sites.

Soon after, he proposed a similar concept to explain the behaviour of synaptic receptors for neurotransmitters. During the decades that followed, he proved this hypothesis, too. He characterised and purified the acetylcholine receptor from the electric organ of a fish, the first receptor for a neurotransmitter and ligand-gated ion channel to be identified.

Further studies have shown that human diseases are associated with mutations that change the conformational equilibrium of allosteric proteins, including growth factor receptors. Furthermore, many of the drugs developed to modulate receptors coupled to G proteins are in fact allosteric modulators. Currently, many pharmaceutical and biotechnology companies are developing allosteric modulators of receptors or other key proteins in human cells for use as efficient drugs in neurological disorders as well as other diseases including cancer.

Moving from the molecules and the isolated neurons or muscle cells to the development of neuronal networks, Professor Changeux and his colleagues made a far-reaching contribution by first proposing in mathematical terms and then testing the theory that the long-term epigenesis of neuronal networks occurs by the selective stabilisation and elimination of developing synapses.

At the same time, he and his colleagues proposed theoretical models for defined cognitive tasks that bridge the gap between molecular biology and cognitive sciences and where allosteric receptors play a key role in the regulation of synaptic efficacy. Furthermore, they put forward an original hypothesis describing a neuronal mechanism for conscious access, implying a "global neuronal workspace" composed of a brain-scale horizontal network of reciprocally connected long axon pyramidal neurons.

Professor Changeux has been concerned about the ethical consequences of recent progress in neuroscience for medicine and for society in general, and has made it widely known in his popular work *L'homme neuronal, (Neuronal Man: The Biology of The Mind)* in 1983. In his book *La Nature et La Règle, Ce Qui Nous Fait Penser* (*What makes us think?)* co-authored with Paul Ricoeur in 1998, a neuroscientist and a philosopher argue about ethics, human nature and the brain. This major work was followed by books on the way we perceive paintings and music or how we think and speak, all of which were further enhanced by Professor Changeux's vast knowledge of art, music, history and philosophy.

During his career, he has accumulated a vast collection of works of art, mostly paintings, lithographs and prints from the seventeenth century. Part of his collection was donated to the Bossuet Art Museum in Meaux.

Professor Changeux has received many major scientific acknowledgements and prizes, among them the Wolf Prize in Medicine (1983), Grand Prix de la Fondation pour la Recherche Médicale (1997), the Linus Pauling medal (1999) and the Balzan prize (2001). He was invited to become a member of various academies of science and letters, among them Academia Europaea, Accademia dei Lincei, Leopoldina and the French Académie des Sciences. He is *doctor honoris causa* of almost twenty universities worldwide.