

## NEWS

### NOBEL PRIZE IN PHYSIOLOGY/MEDICINE - 2000

The Nobel Assembly at Karolinska Institute has awarded the Nobel Prize in Physiology/Medicine for the year 2000 to three distinguished scientists, Arvid Carlsson (Department of Pharmacology, University of Gothenburg), Paul Greengard (Laboratory of Molecular and Cellular Science, Rockefeller University) and Eric Kandel (Center for Neurobiology and Behavior, Columbia University) for their discoveries concerning *signal transduction in the nervous system*.

Their pioneering discoveries have significantly contributed to the understanding of cellular and chemical basis of normal function of brain and this led to the development of new drugs for the treatment of neurological and psychiatric ailments.

In late 1950's Arvid Carlsson established dopamine as an important neurotransmitter. He found that reserpine (a depletor of neurotransmitter from synaptic terminals) administration in animals resulted in symptoms similar to those found in the patients of Parkinson's disease. This led to the finding of low dopamine in basal ganglia (substantia nigra) as the cause of Parkinson's disease. This knowledge was further employed in development of L-dopa as a drug for the treatment of Parkinson's disease. His research improved our understanding about the mechanisms of action of other drugs used in the treatment of schizophrenia, depression and consequent development of new ones.

Late 1960's onwards, Paul Greengard has furthered our understanding about the mechanisms of action of various neurotransmitters, and he established the concept of slow synaptic transmission. His research centered on the understanding of the mechanisms of modulation of neuronal excitability and modulation of its function. He established the cascades of phosphorylation and dephosphorylation as central to these phenomena and later demonstrated that DARPP-32 (Dopamine

Adenosine monophosphate Regulated Phospho-Protein) plays an important role in the phosphorylation-dephosphorylation cascades. This knowledge has led to our understanding of action of various drugs, especially of those which utilize these cascades in different nerve cells.

Eric Kandel started his research on learning and memory in early 1960's and soon realized the need for development of a simple yet comparable model for his investigations. He has since developed and established *Aplysia*, a sea snail, as a model for neurophysiological studies on learning and memory. Through his work, he laid down the principles and mechanisms of short-term memory and long-term memory. He invoked the protein phosphorylation cascade described by Paul Greengard to explain the molecular basis of these memories. He thus demonstrated that both these memories have their foundation in the synapse and modifications of synaptic transmission. In 1990's Kandel applied these principles to mouse model and found that same rules apply. He has provided us with critical building stone in our understanding of complex memory functions. His research has opened up new possibilities of developing drugs for memory enhancement in patients of dementia.

Arvid Carlsson, Paul Greengard and Eric Kandle have put decades of their dedicated and directed efforts in research, and the Nobel Assembly has duly affirmed their contributions to science by awarding them the coveted Nobel Prize in Physiology/Medicine for the year 2000. But perhaps their greatest reward lies in positive changes they have brought in the lives of patients of neuro-psychiatric illness who are being benefited from their research studies.

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