

GPS IN THE BRAIN – THE NOBEL PRIZE FOR MEDICINE 2014

Where am I? Where do I go? How does the brain understand its position in space and navigate effortlessly through complex spaces? Scientists (British-American scientist Dr John O' Keefe; and Dr May-Brit Moser and Dr Edvard Moser from Norway) who discovered "the inner GPS" in the brain have been awarded this year's Nobel Prize in Medicine. The positioning system they discovered helps us know where we are, find our way from place to place and store the information for the next time.

In his youth, Dr Keefe himself was not very clear about where he wanted to be or where he wanted to go. He initially studied the "classics" in school, then switched to aeronautics in college, and finally turned to philosophy and psychology. In the 1960's, he started studying the electrical activity of individual cells in the hippocampus. He found that certain cells burst into life when the rat was in a particular position in the room. And different cells were activated in different positions. He called them "place cells". Initially his discovery was greeted with great ridicule and it took a long time before the scientific community accepted this entity. In 1996, he taught the Mosers how to record the activity in these cells. The Mosers continued the work and discovered another fascinating pattern. They found that as the rat navigated a particular path, a grid of cells in the enterorhinal cortex would light up in special patterns. These grid cells are in the same location as the cells that are lost in Alzheimer's disease. Patients with Alzheimer's disease are known to lose their sense of navigation and position very early, and this research may eventually help in their treatment (*Science*; 6 October 2014)

NANOSCOPY – THE NOBEL PRIZE FOR CHEMISTRY 2014

In 1873, Ernst Abbe declared that optical microscopes could never see objects tinier than 0.2 micron which is half the wavelength of light. The Nobel Prize in Chemistry this year goes to 3 scientists who shattered this belief. They have used ingenious techniques which now enables us to be able to visualize the pathways of individual molecules inside living cells.

In 2000, Stefan Hell from Germany developed stimulated emission depletion (STED) microscopy. In this technique, two laser beams are utilized: one stimulates fluorescent molecules to glow, and the other cancels out all fluorescence except for that in a nanometer-sized volume.

Scanning over the sample yields an image with a resolution better than Abbe's stipulated limit.

The two Americans who share the prize with Hell are Eric Betzig and William Moerner, who laid the foundation for single-molecule microscopy. In this method, the fluorescence of individual molecules is turned on and off. Scientists image the same area multiple times, letting just a few interspersed molecules glow each time. Superimposing these images yields a dense super-image resolved at the nanolevel.

As a result of this groundbreaking work, we can now "see how molecules create synapses between nerve cells in the brain; track proteins involved in Parkinson's, Alzheimer's and Huntington's diseases as they aggregate; follow individual proteins in fertilized eggs as these divide into embryos", according to a statement released by the Royal Swedish Academy of Sciences.

A TOILET FOR EVERY HOME

In May this year, *Katra Sadatganj* Village in Badaun (UP, India) was in the news because of the ghastly murder of 2 sisters who had ventured out to relieve themselves. The country's leading sanitation NGO, Sulabh International adopted the village and has built 108 toilets covering every house. It has now started a "Toilet for every house campaign". Sulabh founder Dr Bindeshwar Pathak quoted 2010 UN figures that state more people had access to a mobile phone than a toilet in India. He has appealed to corporate houses and big organizations to come forward and adopt villages to build toilets in each household (*The Hindu*; 1 September 2014).

WORK ON HOLIDAY

Union Health Minister, Dr Harsh Vardhan, has mooted the idea of "Work on holiday". In view of the shortage of medical professionals in remote and hilly areas, he has suggested that senior doctors could provide professional services while enjoying State Government Hospitality with their families. If secondary and tertiary services could be provided in this manner, the State Government could concentrate on improving primary health services. The challenge will be to develop a method of enrolling for the program and developing consistent care at the periphery (*The Hindu*; 1 September 2014).

GOURI RAO PASSI
gouripassi@hotmail.com