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CONGRATULATIONS, ACKNOWLEDGEMENTS, AND INSPIRATIONS

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EDITORIAL

The Editorial refers to the Nobel Prizes in Physics, Chemistry and Medicine/Physiology awarded in 2012. Here we would like to shortly celebrate the achievements of brilliant scientists but also rejoice in the success of basic science research that led to significant technological and medical applications.

On behalf of the ***Institute of Integrative Omics and Applied Biotechnology*** (IIOAB) and of the Editorial Board of ***The IIOAB Journal***, we would like to congratulate Serge Haroche and David J Wineland, Brian K Kobilka and Robert J Lefkowitz, John B Gurdon and Shinya Yamanaka, on their respective Nobel Prizes in Physics, Chemistry and Medicine/Physiology awarded in 2012.

2012 Physics Laureates: David J. Wineland (left) and Serge Haroche (right) during their interview with Nobelprize.org. Copyright © Nobel Media AB 2012; Photographer: Niklas Elmehed.

Serge Haroche was born in Morocco in 1944. He is a Professor at the College de France. **David J. Wineland** was born in Milwaukee in 1944 as well and graduated in California. He is a physicist at the National Institute of Standards and Technology. Both eminent researchers have been recognized for their "ground-breaking experimental methods that enable measuring and manipulation of individual quantum systems". Serge Haroche made a huge contribution to Cavity Quantum Electrodynamics to study single atom spontaneous emission enhancement, decoherence of state superpositions and atom-photon entanglement [1]. His team was able to store photons between mirrors for "long" periods of time allowing a non-destructive method of detection. His ideas have paved the way to build new devices for opto-electronics and optical communication science. David Wineland first achievement was the establishment of laser cooling that has been used to trap ions and test theories in quantum physics, such as entanglement with two and four ions [2]. The applications of his discoveries are enormous. His research led to the construction of a quantum logic atomic clock, the world's most precise clock, and to the basis of building super fast large-scale quantum computers.

The American physician and scientist **Robert J. Lefkowitz** was born in 1943. He is a Professor of Medicine and Professor of Biochemistry at Duke University. **Brian K. Kobilka** was born in 1955 in Minnesota and is a Professor of Molecular and Cellular Physiology at Stanford University. He worked as a postdoctoral research fellow under Lefkowitz's supervision. They have been awarded for their remarkable contribution to the investigation of the structure and function of G protein-coupled receptors and to the understanding of the role and regulation of these receptors. Robert Lefkowitz is one of the fathers of receptor biology and is well known for his work on the sequence, structure and function of beta-adrenergic and related receptors. He also discovered and characterized two families of regulatory proteins: G-protein coupled receptor kinases (GRKs) and β-arrestins [3].

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2012 Chemistry Laureate Robert J. Lefkowitz. Copyright © Nobel Foundation 2012. Photographer: Ulla Montan.

2012 Chemistry Laureate: Brian K. Kobilka. Copyright © Nobel Foundation 2012. Photographer: Ulla Montan.

Brian Kobilka has a great interest in the biochemical and biophysical approaches allowing the characterization of the dynamic behaviour of G protein-coupled receptors. He obtained the first crystal structures of a hormone/neurotransmitter-activated GPCR. Further important receptor structures were later described, and recently three-dimensional images of GPCR bound to their ligands (agonists and antagonists) have been published [4].

The discovery that all G protein-coupled receptors share a similar molecular structure with seven transmembrane domains helped scientists from pharmaceutical industries to design potent compounds and target one of the largest protein families in humans (about 800 GPCRs have been identified so far). Nowadays, about 40 percent of all drugs prescribed are designed to target these receptors, including antipsychotics, antihistamines, ulcer drugs and beta blockers that treat cardiovascular diseases.

2012 Medicine Laureates: Sir John B. Gurdon (left) and Shinya Yamanaka (right) during their interview with Nobelprize.org. Copyright © Nobel Media AB 2012, Photographer: Niklas Elmehed.

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John B. Gurdon was born in 1933 and is an Emeritus Professor in the Department of Zoology at the University of Cambridge. **Shinya Yamanaka** was born in Higashiōsaka in 1962. He serves as a Professor at Kyoto University and as a senior investigator at the Gladstone Institute of Cardiovascular Disease. Their respective work on somatic cell nuclear reprogramming [5] and human pluripotent stem cells [6] led them to obtain the Nobel Prize this year. The initial and revolutionary experiment by John Gurdon in 1962 demonstrated that an immature cell nucleus in a frog egg cell could be replaced with the nucleus from a mature intestinal epithelium cell, and then developed into a tadpole. This laid the foundation for cloning experiments. Then a major step forward was brought about by Shinya Yamanaka who overcame the critical issue of working with cells derived from live human embryos. Indeed, it is since 2007 possible to turn adult somatic cells (from animals and now humans) into pluripotent stem cells and (re)program them into specialized cells such as neurones and cardiac myocytes. Fibroblasts from patients affected by diseases can therefore be reprogrammed into particular cell types in order to study them in vitro. This opens the perspective of an ethical regenerative medicine and will encourage the progress in personalized medicine.

All these impressive stories of determination, diligence, motivation, patience, humility, innovation, optimism and courage are the best illustrations that basic science should be further promoted and properly funded. Fundamental research thus works hand in hand with technology, medicine and social interests. It is still worth investing in these interconnections, both financially and humanly. In these difficult times of economical instability, it is now the right moment to think about how our resources should be stirred up to ensure a sustainable world.

We may take this opportunity to introduce here a new scheme in The IIOAB Journal. Each year the Editorial Board will select among the contributions published in the journal the article with the highest impact that will be recognized with the Best Article Award.

“Not everything that can be counted counts, and not everything that counts can be counted.”…….Citation attributed to Albert Einstein.

"I believe he has ideas about becoming a Scientist; on his present showing this is quite ridiculous."…….2012 Nobel Prize winner John Gurdon's school report card.

The opinions expressed in this article are not necessarily those of the Editors of The IIOAB Journal or of the Institute of Integrative Omics and Applied Biotechnology.

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CONFLICT OF INTERESTS

The author states that he has no conflict of interest pertaining to this manuscript.

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