

Chemistry

This year's Nobel Prize in Chemistry was awarded by the Royal Swedish Academy of Sciences to Robert J. Lefkowitz (Howard Hughes Medical Institute (HHMI) and Duke University Medical Center, Durham) and Brian K. Kobilka (Stanford University School of Medicine) for their studies of G-protein-coupled receptors (GPCRs). Such receptors enable cells to sense their environment, for example small-molecule hormones such as adrenalin and beta blockers. Lefkowitz started to use radiolabeled hormones to investigate and isolate receptors from cell walls as early as 1968. In the 1980s, Kobilka joined his team and isolated the gene that codes for the β -adrenergic receptor from the human genome. They discovered that the receptor was similar to the light receptor in the eye, and that there is an entire family of such receptors for light, flavors, and more: the GPCRs. They are members of the family of integral membrane proteins, which mediate the transfer of material and signals between the environment and the cytoplasm. In particular, GPCRs activate G proteins inside cells, which in turn trigger a chain of reactions that alters the metabolism of a cell. In 2011, Kobilka's team managed to capture a receptor in the act of being activated by a hormone and sending a signal to the cell. Today, about 30 % of drugs target GPCRs.^[1]

Lefkowitz obtained an MD from Columbia University in 1966 and served as a clinical and research associate at the NIH. From 1970 to 1973, he was at the Massachusetts General Hospital in Boston. In 1973, he joined the faculty at Duke University and became an investigator at the HHMI in 1976. He received the US National Medal of Science in 2007.

Kobilka earned his MD from Yale University and joined Lefkowitz's team at Duke University as a postdoctoral researcher. In 1989, he joined the faculty at Stanford University. A recent article on amphiphiles for solubilization and stabilization of membrane proteins by Kobilka et al. was featured on the inside cover of *Chemistry—A European Journal*^[2] and he contributed an article on functional immobilization of a ligand-activated GPCR^[3] to a special issue on GPCRs in *ChemBioChem*.

Physiology/Medicine

The Nobel Prize in Physiology or Medicine 2012 was awarded jointly to Sir John B. Gurdon (University of Cambridge) and Shinya Yamanaka (Kyoto University and Gladstone Institutes, San Francisco) for the discovery that mature cells can be reprogrammed to become pluripotent. Their discoveries opened new routes to stem cells and thus avoid ethical problems with the current method of generation from embryos.

Physics

The Nobel Prize in Physics 2012 was awarded jointly to Serge Haroche (Collège de France and Ecole Normale Supérieure, Paris) and David J. Wineland (National Institute of Standards and Technology, and University of Colorado, Boulder) for the development of traps for single photons (Haroche) and ions (Wineland) that allow the particles to be examined, controlled, and counted individually. These may be the very first steps towards building super-fast quantum computers.^[4]

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- [2] P. S. Chae, S. G. F. Rasmussen, R. R. Rana, K. Got-fryd, A. C. Kruse, A. Manglik, K. H. Cho, S. Nurva, U. Gether, L. Guan, C. J. Loland, B. Byrne, B. K. Kobilka, S. H. Gellman, *Chem. Eur. J.* **2012**, *18*, 9485.
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- [4] From special issues on quantum computing: D. J. Wineland, C. Monroe, W. M. Itano, B. E. King, D. Leibfried, D. M. Meekhof, C. Myatt, C. Wood, *Fortschr. Phys.* **1998**, *46*, 363; R. Reichle, D. Leibfried, R. B. Blakestad, J. Britton, J. D. Jost, E. Knill, C. Langer, R. Ozeri, S. Seidelin, D. J. Wineland, *Fortschr. Phys.* **2006**, *54*, 666.

DOI: 10.1002/anie.201208179

Nobel Prizes 2012



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