

# ***COLLOQUIA IN MEMBRANE TRANSPORT***

Venue: Medical University Vienna, Center for Physiology and Pharmacology,  
Institute of Pharmacology, Waehringerstrasse 13a, 1090 Vienna, "**Leseraum**".

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Thursday 16.02.2012 15:00 s.t. Dirk Trauner (host: Harald Sitte)  
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## ***"Optochemical Genetics"***

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**Dirk Trauner (Email: [Dirk.Trauner@lmu.de](mailto:Dirk.Trauner@lmu.de))**

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### Abstract:

Transmembrane receptors allow a cell to communicate with its environment in response to a variety of input signals. These can be changes in the concentration of ligands (e.g. hormones or neurotransmitters), temperature, pressure (e.g. via acoustic waves or touch), transmembrane potential, or light intensity. Many important receptors have now been characterized in atomic detail and our understanding of their functional properties has markedly increased in recent years. As a consequence, these sophisticated molecular machines can be reprogrammed to respond to unnatural input signals. Arguably, the most useful of these signals is light. I will show how ligand-gated ion channels, G-protein coupled receptors, as well as voltage-gated ion channels, can be manipulated with synthetic photoswitches to become light-sensitive. The resulting hybrid photoreceptors can be used to optically control neurons with very high precision. They have been used to dissect neural networks and have already found applications in the restoration of vision and the control of other sensations (such as pain). This combination of synthetic photoswitches and receptor proteins augments the field of Optogenetics and adds a new functional dimension to Chemical Genetics. As such, we propose to call it "Optochemical Genetics".

