The 2013 LOUIS-JEANTET PRIZE FOR MEDICINE is awarded to the geneticist, Michael Stratton, director of the Wellcome Trust Sanger Institute in Cambridge, and jointly to the German biochemists Peter Hegemann, researcher at the Department of Experimental Biophysics at the Humboldt University, Berlin, and Georg Nagel, researcher at the Institute Julius-von-Sachs at the Biocenter, University of Wurzburg.

The LOUIS-JEANTET FOUNDATION grants the sum of CHF 700'000 for each of the two 2013 prizes, of which CHF 625'000 is for the continuation of the prize-winner's work and CHF 75’000 for their personal use.

THE PRIZE-WINNERS are conducting fundamental biological research which is expected to be of considerable significance for medicine.

MICHAEL STRATTON is awarded the 2013 Louis-Jeantet Prize for Medicine for his work a imed at understanding the genetic causes of human cancer.

The British researcher is one of the worldwide leaders in the study of cancer genomics and genetics. He notably directed the team that discovered the *BRCA2* gene which, when mutated, causes predisposition to breast and ovarian cancer. Through the Cancer Genome Project started in 2000 at the Wellcome Trust Sanger Institute under his aegis, Michael Stratton demonstrated the presence of mutations in the
BRAF
gene in 60% of cases of malignant melanoma. Eight years later this discovery led to the development of new, and for the first time successful, treatments against this serious form of skin cancer.

Michael Stratton will use the prize money to conduct further research into cancer genetics at the early developmental stages.

PETER HEGEMANN and GEORG NAGEL are jointly awarded the 2013 Louis-Jeantet Prize for Medicine for their discovery of ion channels that can be activated by light. They have thus created a new and most promising discipline in the field of neurosciences - "optogenetics".

Peter Hegemann showed that photosensitive proteins controlled the movements of the microscopic green alga *Chlamydomonas reinhardtii*, which only moves in function of its exposure to light. Georg Nagel showed that rhodopsins from microbes, including the ones from the alga, can be brought into animal cells where they function well and their working can be studied. Together they studied the functionality of these proteins in depth. They thus discovered the unique property of ion channels that may be activated under exposure to light and are usable for the study of neural circuits
in vitro
and
in vivo
with so far unmatched levels of precision. The two researchers thus initiated a new discipline – optogenetics - that offers an entirely new perspective for the treatment of certain neurological diseases in particular.

Peter Hegemann and Georg Nagel will use the prize money to continue their research into proteins that may be activated by exposure to light.

THE AWARD CEREMONY will be held in Geneva (Switzerland) on Thursday, 18 April 2013.

MICHAEL STRATTON

Born 1957 in the United Kingdom, Michael Stratton studied medicine at the University of Oxford and Guy's Hospital, London. Following internships, he trained as a histopathologist and subsequently obtained his PhD in molecular biology of cancer at the Institute of Cancer Research, London. There, in 1991, he set up an independent faculty group focusing on cancer susceptibility. Six years later, he was made professor of Cancer Genetics and chair of the newly constituted Section of cancer Genetics. In 2000, he moved to the Wellcome Trust Sanger Institute as Head of the Cancer Genome Project and was named Director of the Institute in 2010.

Michael Stratton was elected Fellow of the UK Academy of Medical Sciences in 1999 and of the Royal Society in 2008. He is also a member of EMBO (the European Molecular Biology Organization). His research on cancer has won him numerous distinctions in Europe and in the USA. He was notably awarded the Lila Gruber Award for Cancer Research by the American Academy of Dermatology, the C. Chester Stock Award by Memorial Sloan Kettering Cancer Center and the Massachusetts General Hospital Award in Cancer Research.

Cancer genes

All cancers have their origins in defective genes. When genes are modified (or suffer mutations), they disrupt the way cells work, either causing them to divide in an uncontrolled manner, or to continue to live when they should normally autodestruct (apoptosis). They then end up spreading around and invading the organism. In other words mutated genes – cancer genes – change a normal cell into a cancer cell.

As certain cancer genes can be hereditary, Michael Stratton studied families where breast cancer had occurred frequently. In this way he identified one of the main causes: the gene *BRCA2.*
This gene is now routinely checked in order to identify those persons at risk, to guard against the disease and, should it occur, to treat it more effectively.

Michael Stratton then looked at genetic modifications that build up throughout a person's lifetime, known as somatic mutations. Taking advantage of the decoding on the human genome, he involved his team in a major experiment across the whole human genome, seeking to identify the mutated genes leading to all types of cancers. He has thus identified a large number of these mutated genes, and notably the *BRAF* gene present in six out of ten skin cancers.

These somatic mutations that build up throughout everyone's lifetime constitute a kind of "archaeological chronicle", as they contain the record of each cancer cell's life history. Michael Stratton has decided to track down the origin of these mutations. Are the causes environmental or linked with lifestyle, or are they due to the body's internal biochemical processes? Unravelling this mystery is important; it will allow us to understand the fundamental causes of cancer.

PETER HEGEMANN and GEORG NAGEL

Peter Hegemann was born 1954 in Munster, studied chemistry in his home town and then in Munich, where he was awarded his PhD in biochemistry. He then left for the USA and post-doctoral work at the University of Syracuse (State of New York). On his return to Germany in 1986, he was a research group leader at the Max-Planck Institute for Biochemistry, after which he was named Professor of Biochemistry at the University of Regensburg. Since 2004, he holds the position of Professor of Experimental Biophysics at the Humboldt University, Berlin. Peter Hegemann is a member of the German National Academy of Sciences, Leopoldina.

Georg Nagel was born 1953 in Weingarten near Ravensburg. He studied biology and biophysics at the recently created University of Konstanz. After teaching for several years at high school in Switzerland, he continued his education and was awarded his PhD in biology and biophysics at the University of Frankfurt am Main in 1988. Thereafter he left for the USA for post-doctoral training at Yale University, then Rockefeller University. He returned to Germany in 1992, where he became a group leader in the Department of Biophysical Chemistry at the Max-Planck Institute of Biophysics. Since 2004, he is Professor of Molecular Plant Physiology and Biophysics at the University of Wurzburg (Bavaria).

Peter Hegemann and Georg Nagel have already shared several distinctions, notably the Wiley Prize in Biomedical Sciences, USA (2010), and the Karl-Heinz-Beckurts Prize (2010) and Klaus-Joachim-Zülch Prize (2012) in Germany.

From green alga to neurosciences

It all started back in the 1980's, when Peter Hegemann tried to understand how a microscopic green alga, *Chlamydomonas reinhardtii*, achieves to move towards or away from a light source. After about 10 years of research, he suggested that a closely linked protein complex consisting of rhodopsin and a calcium channel depolarises the alga's membrane which is sensed by the flagella that modify the movement according to light intensity and color. Peter Hegemann identified the rhodopsin genes in a Japanese cDNA bank and sent the cDNA to Georg Nagel. Georg Nagel succeeded in expressing the rhodopsin proteins in animal cells and in characterizing in detail their function. He confirmed and extended Peter Hegemann's

hypothesis by demonstrating that the rhodopsins – which he called Channelrhodpsins - function as light-driven ion channels.

As the two biochemists had suggested, this mechanism does not only function in algae. The Channelrhodopsins can be expressed, for example, in nerve cells (neurons) of numerous animal species, from worms to primates, to make them light-sensitive and to study the function of selected neurons in the context of their network.

The two German scientists thus ushered in a new discipline – optogenetics – chosen by the Journal *Nature Methods* as the "Method of the Year" for 2010. It has indeed emerged that light can stimulate neurons in higher species, opening the way for numerous medical applications. It is to be hoped that light may be used to give back rudimentary vision to blind people, to stimulate the deep brain of patients suffering from Parkinson's, even to influence cardiac rhythm for the treatment of heart failure.

THE LOUIS-JEANTET PRIZE FOR MEDICINE

Every year, the Louis-Jeantet Prize for Medicine distinguishes leading-edge researchers who are active in the European Council member countries.

Established in 1986, the Louis-Jeantet Prize for medicine has thus so far been awarded to 78 researchers: 25 in the United Kingdom, 14 in Germany, 14 in Switzerland, 12 in France, three in the Netherlands, three in Sweden, two in Belgium, two in Finland, two in Norway and one in Austria. Their geographical distribution by country does not reflect the nationalities of the prize-winners - who can come from all over the world. It reflects the spread of the European centres of excellence in biomedical research.

The key research fields encouraged by the Louis-Jeantet Prize for medicine are physiology, biophysics, structural biology, biochemistry, cellular and molecular biology, developmental biology and genetics.

As one of the best-endowed awards in Europe, the Louis-Jeantet Prize for medicine fosters

scientific excellence. It is not intended as the consecration for work that has been completed, but to encourage the continuation of innovative research projects with high added value and of more or less immediate practical significance in the treatment of diseases.

Since 1986, a total sum of approximately CHF 53m has been awarded by the Foundation to the 78 prize-winners for the continuation of their work.

THE LOUIS-JEANTET FOUNDATION

The aim of the Louis-Jeantet Foundation is to move medicine forward, and to defend the role and identity of European biomedical research vs. international competition. It is the posthumous work of Louis Jeantet, a French businessman and a citizen of Geneva by adoption. Established in Geneva (Switzerland), the Foundation commenced activities in 1983.

The Louis-Jeantet Foundation devotes some CHF 4.5m each year to promoting biomedical research. It invests this sum in equal proportions for European and for local research projects. On the local level, the Foundation encourages teaching and the development of research at the Faculty of Medicine of the University of Geneva, as well as the synergy of competences between this faculty and the graduate schools and university hospitals of the Lake Geneva region.

Since 2010, EMBO and the Louis-Jeantet Foundation are cooperating to promote the leading-edge research work of the winners of the Louis-Jeantet Prize for medicine. In this context, the journal *EMBO Molecular Medicine* **features special contributions by the prize-winners and The EMBO Meeting hosts the Louis-Jeantet prize-winners' Lectures .**