Research Report 2009

Max Planck Institute for Molecular Genetics

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Organisational structure

The Max Planck Institute for Molecular Genetics

Mission

Research at the Max Planck Institute for Molecular Genetics (MPIMG) concentrates on genome analysis of humans and other organisms to elucidate cellular processes and genetic diseases. It is the overall goal of the combined efforts of all MPIMG groups to gain new insights into the development of diseases on a molecular level, thus contributing to the development of cause-related new medical treatments.

Development of the Institute

The Max Planck Institute for Molecular Genetics (MPIMG) was founded in 1964 with the appointment of Heinz-Günther Wittmann and Heinz Schuster as heads of department, followed by the appointment of Thomas Trautner in 1965. At this time, the research of the institute was focussing on DNA replication and gene regulation in bacteria, bacterial phage and fungi (departments Schuster and Trautner) and on the structure, function and evolution of ribosomes which were central to the work of H.-G. Wittmann. In 1970, the three departments, as well as four independent junior research groups (the future Otto Warburg Laboratories) moved into the new premises of the institute situated in the Ihnestraße, Berlin-Dahlem.

After the sudden death of H.-G. Wittmann in 1990 and the retirement of H. Schuster in 1995, the appointments of Hans Lehrach (1994, Dept. of Vertebrate Genomics), and Hans-Hilger Ropers (Dept. of Human Molecular Genetics, full-time since 1997) induced a major shift in the scientific orientation of the institute. Following the retirement of T. Trautner in 2000, Martin Vingron was appointed as head of the new Department for Computational Molecular Biology. At the same time, Stefan Mundlos was jointly appointed by the Humboldt University of Berlin as head of the Institute for Medical Genetics, now integrated in the Campus Virchow of the Charité - Universitätsmedizin Berlin, and by the Max Planck Society as head of an independent research group at the MPIMG. As most recent recruitment, Bernhard Herrmann was appointed as director and head of the Department of Developmental Genetics in 2003. Bernhard Herrmann was also jointly appointed by the Free University of Berlin as professor and head of the Institute of Medical Genetics (now part of the Campus Benjamin Franklin of the Charité).

In the years 2004 - 2005 all three independent junior research group leaders of the Otto Warburg Laboratory obtained new positions and left the institute. Ann Ehrenhofer-Murray and Andrea Vortkamp were appointed as full professors by German universities, Adam Antebi joined the faculty of Baylor College in Houston, Texas, U.S.A. In the meantime, Adam Antebi has been appointed as member of the Max Planck Society and head of a research department. The externally funded fourth group leader, Edda Klipp, was appointed in 2008 as full professor at the Humboldt University of Berlin. In 2004 a new independent junior research group in Bioinformatics, headed by Michael Lappe, took up its work, and in 2007 another group working on molecular interaction networks was recruited, which is headed by Ulrich Stelzl. More recently, the Otto Warburg Laboratory was brought up to four groups, two of them, headed by Sylvia Krobitsch and Sascha Sauer, funded by external sources.

In 2006, the International Max Planck Research School for Computational Biology and Scientific Computing was founded together with the Free University of Berlin. In addition the institute is involved in the Berlin School for Regenerative Therapies, housed at Humboldt University, and in teaching of medical student in several curricula. In 2008, an internal PhD programme for students was started at the MPIMG.

Research Concept

Genome research, the systematic study of genes and genomes, has changed the way in which research in molecular genetics is pursued. The focus and composition of the MPI for Molecular Genetics reflects this development. Large scale genome research (Dept. Lehrach), applying a variety of technologies, generates data on genome sequences, genes, and their function, which are then used to build predictive models of biological networks in human diseases and development. Human molecular genetics (Dept. Ropers) employs complementary approaches to search for novel disease genes and their biological function in a systematic manner, as a strategy for identifying genetic risk factors and pathogenetic pathways for common and rare diseases. Computational molecular biology (Dept. Vingron) exploits genomic data to better understand gene regulation and evolution. The Developmental Genetics Department (Dept. Herrmann) uses systematic functional analysis for understanding developmental mechanisms.

Recently, new sequencing technologies (massively parallel sequencing) have opened up new approaches for genome-wide analyses of gene expression (transcriptome) and epigenetic control (analyses of methylated DNA regions and chromatin modifications). It also provides more sensitive ways for the detection of chromosomal rearrangements, copy number differences and other genetic alterations involved in disease, and it promises to yield novel tools for their diagnosis. Massively parallel sequencing has become in-dispensable for the research of all departments.

Almost half of the institute's research budget is obtained as grant money from external sources, such as the German Ministry of Education and Research, the European Union, the German Research Foundation (DFG) and others. The institute is - as sole German member - involved in the 1000 Genomes Project, a follow-up of the international Human Genome Project and HapMap Project. Several groups of the institute coordinate or participate in consortia involved in the German National Genome Research Network (NGFN), which focuses on basic and translational research of human disease. Major topics comprise cancer research and mental retardation. Other prominent projects include a number of EU projects, as well as DFG Collaborative Research Centres ("Sonderforschungsbereiche").

With its involvement in national and international research projects and by virtue of the research output of the institute, the MPIMG is perceived internationally as a stronghold of genome and genetics research in Germany. Maintaining this status in the future will require continuing technological innovation and close cooperation with the universities. Integration between genome research and genetics, as well as between experimental and computational biological research are central in this effort.

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Prof. Dr. Hans Lehrach
Prof. Dr. H.-Hilger Ropers
Prof. Dr. Martin Vingron