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## The fourth man on board

Dr. Juan M. Vaquerizas boosts computational biology as the fourth Max Planck Research Group leader at the Max Planck Institute in Münster

**Dr. Juan M. Vaquerizas took up his employment as the leader of the Max Planck Research Group „Regulatory Genomics“ at the Max Planck Institute for Molecular Biomedicine in Münster a few weeks ago. He occupies the fourth and final position that is financed in equal parts by the Max Planck Society and the Ministry of Innovation, Science and Research of the State of North Rhine-Westphalia. Vaquerizas' research interest is computational biology: his team will analyze large amounts of data with respect to gene regulation. The research group is funded for 5 years and will consist of 6 to 8 people by the end of 2013.**

The work of Dr. Juan M. Vaquerizas can be divided into two specific interests: on one hand, he will investigate how the three-dimensional organisation of the genome influences the gene expression. On the other hand, he aims to understand the mechanisms that regulate whether the parental or maternal copy of a gene is active. Both interests have one thing in common: they deal with the activation of genes, with 'epigenetics'.

When scientists announced the deciphering of the complete human genome with its roughly 23,000 genes almost ten years ago, they hoped to have acquired a better understanding of the human genome and the origin of diseases. However, knowledge of the gene sequences alone is not sufficient, because not all genes are expressed in all cell types to the same extent. Biochemical changes of the genome are responsible for switching on and off various genes in the different cell types. This makes sense, because some of the genes that are active in neurons are for instance silenced in skin cells. How this is accomplished is only known to a limited extent.

"Already during my doctoral thesis, I was interested in the mechanisms by which genes work together. I think it is especially exciting to investigate these mechanisms by computational biology", says Dr. Juan Vaquerizas. Nowadays, scientists cannot approach such problems without computers –modern methods of gene analyses produce very large sets of data. Not only are the sequence and position of the 'characters' in the genome determined, also the amount of the respective proteins and their DNA-binding position are recorded. As a result, one analysis can easily consist of 150 million pieces of information.

In his new group at the MPI, Vaquerizas will examine the genomes of different organisms, such as yeast, fruit flies and zebra fish, to understand how the three-dimensional structure of the DNA in the nucleus affects which genes are turned on or off. The DNA in the nucleus is wrapped by different proteins, which constitute the chromatin. When a gene is activated, dense, inaccessible chromatin has to open up so that the proteins complexes responsible for the activation can access the gene. Over the past few years, scientists have found that the three-dimensional positioning of this chromatin in the nucleus is crucial for a correct regulation of genes.

"Compartmentalization is yet another mechanism of epigenetics. I would like to further investigate the mechanisms that regulate this very interesting, three-dimensional organisation of the chromatin in the nucleus", says Vaquerizas.

The Max Planck Institute (MPI) for Molecular Biomedicine provides the perfect environment for Vaquerizas: "I'm really excited to be surrounded by experimentalist. The scientists at the institute work with several very interesting animal models, and have a great expertise in the

numerous analysis techniques. This really facilitates my work as a computational biologist and provides room for many interactions.”

The Ministry for Innovation, Science and Research of the State of North Rhine-Westphalia (NRW) and the Max Planck Society (MPS) are financing four Max Planck Research Groups at the MPI for Molecular Biomedicine for five years. Three research group leaders had started in 2010. They are accommodated in renovated rooms of the University of Münster at the Von-Esmarch-Straße. The renovation was financed with 8.5 million euros from the 'economic-growth package II' of the Innovation Ministry NRW. On top, the Medical Faculty contributed to this project with 1.5 million euros from their own funds.

Professor Dr. Ralf Adams, Managing Director at the MPI for Molecular Biomedicine, is delighted about the reinforcement: “It took some time, unfortunately, until we had found the perfect candidate for the fourth position. Now we are glad that Dr. Vaquerizas is not only strengthening our institute. His group will also enhance the good cooperation of the MPI with the University Clinics and the University of Münster.”

### **About Dr. Juan M. Vaquerizas**

After his studies in Molecular Biology in Madrid, Juan M. Vaquerizas (32) completed his doctoral thesis in Computational Biology at the Spanish National Cancer Center (CNIO) in 2008, where he was awarded an Extraordinary PhD Award for work determining the repertoire of human transcription factors. He subsequently joined the European Bioinformatics Institute of the European Molecular Biology Laboratory (EMBL-EBI) in Cambridge, England, to work on the epigenetic regulation of dosage compensation in *Drosophila*. During this period, Vaquerizas has had fruitful collaborations with many scientists including Nick Luscombe (University College London, UK), Sarah Teichmann (MRC-LBM, Cambridge, UK), Asifa Akhtar (MPI Freiburg), or Sydney Brenner, Nobel price laureate for Medicine and Physiology 2002, with whom he continues studying human transcription factors.. Since October 2012, Vaquerizas heads the Max Planck Research Group „Regulatory Genomics“ at the Max Planck Institute for Molecular Biomedicine in Münster.

► <http://www.mpi-muenster.mpg.de/research/teams/groups/rgvaquerizas/index.html>

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### **Press photos**

A press photo concerning the press release can be requested with Dr. Jeanine Müller-Keuker by telephone or e-mail.



**Dr. Juan M. Vaquerizas**

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