PRESS RELEASE

Joan Barau joins IMB as a new Group Leader

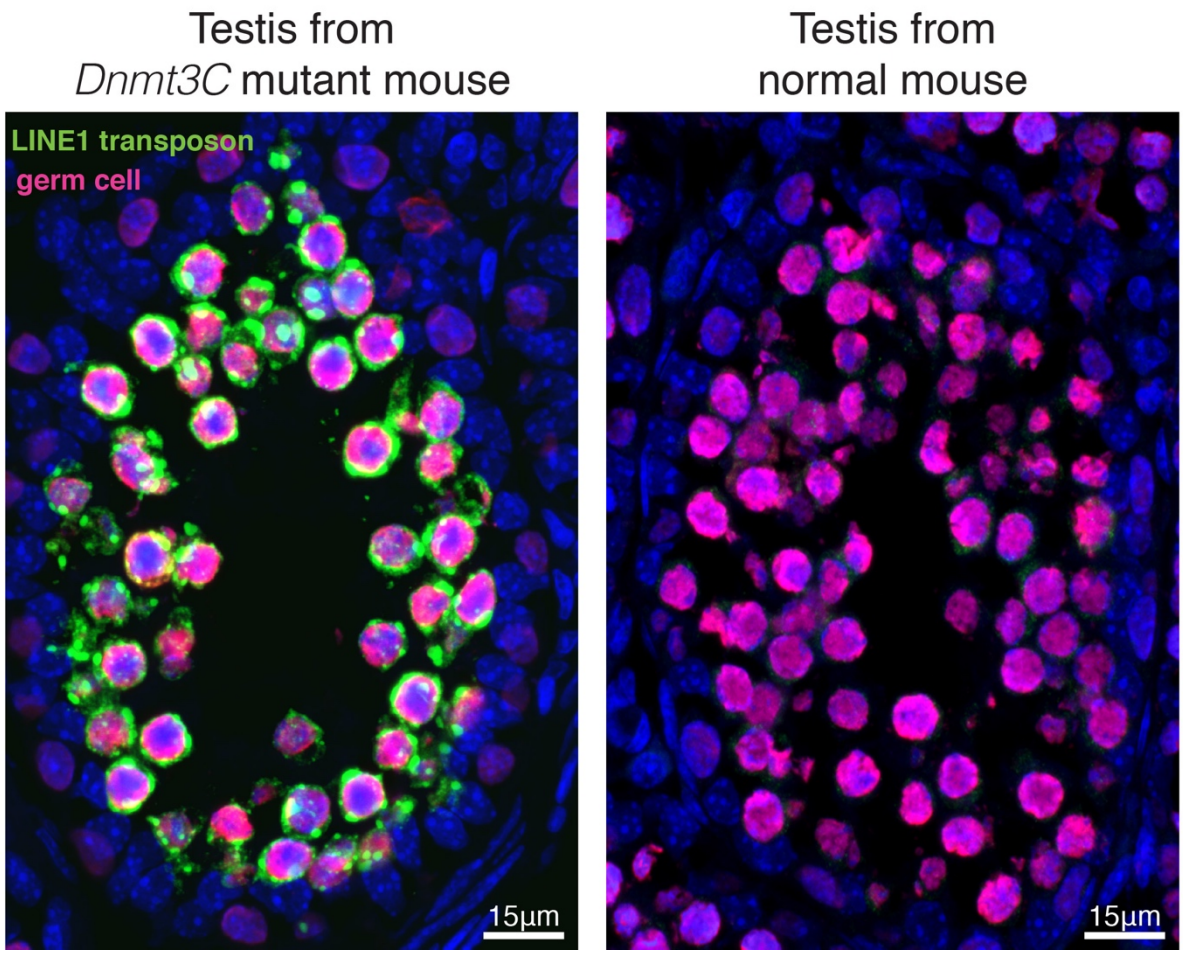
Mainz, 1 April 2019. *The Institute of Molecular Biology (IMB) is delighted to welcome Dr Joan Barau as a Junior Group Leader. Dr Barau investigates how the epigenetics of the germ cell lineage and intragenomic conflict impact mammalian fertility.*

The blueprint for every living organism on Earth is coded into its genome in the form of DNA and made manifest through the activity of genes. Indeed, each genome can be viewed as its own environment. This environment is populated by genes whose specific behaviour gives each cell its own identity. Like any environment, a genome is subject to outside disruption, particularly through genetic parasites. These are chunks of foreign DNA that exploit a genome's replication ability without giving any direct benefit to the cell or organism as a whole. This is particularly relevant for the genomes of cells involved in reproduction. Genetic parasites and their activity within a genome can threaten its stability and thus its ability to be inherited correctly by offspring.

These parasites – known as transposons – are prolific: more than 50% of a human's genome derives from them. Transposons have the ability to move within a genome, hence their name. They maintain their presence not through their usefulness but through over-replication and increasing copy numbers. This disruptive invasion and increasing genetic burden does not go unchallenged. Genomes fight back through selection for mechanisms that allow the suppression and elimination of parasitic DNA. This self-propagating conflict has been shaping the sequence and structure of genomes for billions of years. It also provides fertile ground for the evolution of novel mechanisms of genome regulation that play essential roles in normal and pathological development.

In joining IMB, Dr Barau will bring his expertise in the various mechanisms genomes use to counteract the presence of transposons. His group will continue to investigate new mechanisms of transposon regulation at all levels of cell and organismal biology. In particular studying how and if these mechanisms are repurposed during normal and pathological development in mammals. As Dr Barau explains, "because the germ cell lineage represents a hotspot of transposon activity, our group will maintain a strong focus into germ cells and early embryos. We will also expand to other relevant physiological contexts including examples of their involvement in development, gene regulation and disease."

Dr Barau explains he will focus on how mammals use classical modifications to DNA (epigenetic) to properly regulate the production of genomes in gamete cells while at the same time keeping transposons in check. "Cytosine methylation is a widespread epigenetic modification that mammalian genomes use to repress transposons and it has a crucial role for germline development and fertility (see picture). We are very interested in understanding how cells reprogramme this mark during gamete cell production ensuring it is absent from germline genes but placed back selectively at transposons. While scientists have known for over ten years that small RNAs are involved, the precise mechanisms and proteins behind this mechanism are still poorly understood."



Transposon repression is essential for fertility. *In absence of Cytosine DNA methylation during spermatogenesis in the mouse, transposons become active (accumulate L1-ORF1 protein in green) leading to apoptosis of all germ cells and infertility.*

About the Institute of Molecular Biology gGmbH

The Institute of Molecular Biology gGmbH (IMB) is a centre of excellence in the life sciences that was established in 2011 on the campus of Johannes Gutenberg University Mainz (JGU). Research at IMB focuses on three cutting-edge areas: epigenetics, developmental biology, and genome stability. The Institute is a prime example of successful collaboration between a private foundation and government: The Boehringer Ingelheim Foundation has committed 154 million euros to be disbursed from 2009 until 2027 to cover the operating costs of research at IMB. The State of Rhineland-Palatinate has provided approximately 50 million euros for the construction of a state-of-the-art building and will give further 52 million in core funding from 2020 until 2027. For more information about IMB, please visit: www.imb.de.

Boehringer Ingelheim Foundation

The Boehringer Ingelheim Foundation is an independent, non-profit organization committed to the promotion of the medical, biological, chemical, and pharmaceutical sciences. It was established in 1977 by Hubertus Liebrecht (1931–1991), a member of the shareholder family of the company Boehringer Ingelheim. With the Perspectives Programme “Plus 3” and the Exploration Grants, the foundation supports independent junior group leaders. It also endows the internationally renowned Heinrich Wieland Prize as well as awards for up-and-coming scientists. In addition, the Foundation is donating a total of 154 million euros from 2009 to 2027 to the University of Mainz for the Institute of Molecular Biology (IMB). Since 2013, the Foundation has been providing a further 50 million euros for the development of the life sciences at the University of Mainz. www.bistiftung.de

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