BIOLOGY COLLOQUIUM

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Hosted by Assistant Professor Lau On Sun

Transcriptional activity is shaped by the chromatin landscapes

By Frederic Berger

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About the Speaker

Frederic Berger's Ph.D. studies were supervised by Dr C. Bownlee at the Marine Biological Association (Plymouth, U.K.) and led to the demonstration of the origin of cell fate memory in the extra-cellular matrix of plant cells. He has been working in TLL as a Senior Principal Investigator from 2004 to 2014. During this period, he pioneered developmental work on endosperm and contributed to mechanistic understanding of the control of parental imprinting. Interest in reprogramming led to a shift in his focus to research histone variants when he moved to the Gregor Mendel Institute in Vienna. There, the Berger lab now studies chromatin and evolution using the flowering plant Arabidopsis and the liverwort Marchantia polymorpha

To which extent chromatin shapes transcriptional activity has remained unclear. To clarify the relationship between chromatin and transcription, we examined chromatin organization in the Arabidopsis genome. We identified a limited number of chromatin landscapes that distinguish transposon families and distinct groups of genes based on their transcriptional regulation. Unexpectedly, Histone variants appear as strong determinants of the chromatin landscapes. Six chromatin landscapes are occupied by specific transposon families silenced by distinct mechanisms. Three chromatin landscapes associate with distinct modes of transcriptional gene repression. Expressed genes with distinct functions occupy four chromatin landscapes that specify distinct ranges of transcriptional activity driven by specific families of transcription factors. Overall, the study indicates that chromatin instructs transcriptional activity.