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# Exit Seminar: Evolution of transcriptional inactivation on sex chromosomes in birds and mammals

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Gould Seminar Room Gould Building (Bldg. 116), Linnaeus Way, ANU



Dosage compensation is a mechanism that balances the expression of genes on the sex chromosomes so that they are equally expressed in males and females. In therian (placental and marsupial) mammals this is achieved by silencing one X chromosome in XX female somatic cells. In contrast, genes on the five X chromosomes of the platypus, a monotreme mammal, and on the orthologous but independently evolved chicken Z chromosome are expressed globally at a higher level in the homogametic sex (platypus female and ZZ chicken male).

My study aimed at further characterizing silencing on the platypus X chromosomes, as well as determining whether inactivation is involved in the partial dosage compensation system in chicken. Furthermore, I investigated the mechanisms behind sex chromosome inactivation.

I used RNA-FISH to elucidate the transcriptional status of genes on the chicken Z and platypus X chromosomes. I showed that inactivation occurs on the chicken Z chromosome, and similar to platypus, is incomplete and locus specific. In chicken, I found evidence that silencing of Z genes could involve DNA methylation, as does X chromosome inactivation (XCI) in placentals. I also found that silencing of platypus X genes could involve inactive histone modifications that are involved in XCI in therians.

My study provided evidence that probabilistic silencing on sex chromosomes was exapted independently in therian mammals, monotreme mammals and birds (although it occurs to different extents) from a common epigenetic toolbox, as an early step in the evolution of sex chromosome inactivation.

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