Transgenerational epigenetic inheritance in planarians

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Information is key to life. Most of it is hardcoded in the genome and t?hus transferred to the next generation. However, the genome does not encode all relevant information. Over the past decade, additional information transfer mechanisms have emerged, known as epigenetic inheritance. Epigenetic inheritance provides an alternative route for passing information and maintaining organismal memory from parent to progeny, but this type of information is not transferred indefinitely and unconditionally across generations. Its roles and functions are therefore conceptually different from DNA sequence encoding, which raises a range of intriguing mechanistic and conceptual questions. The project will explore transgenerational inheritance in organisms capable of whole body regeneration, planarian flatworms. So far, transgenerational epigenetic inheritance has been investigated only in a handful of organisms. It is best understood in the roundworm Caenorhabditis elegans, where the inhibition of gene expression by RNA interference (RNAi) is transferred from parent to offspring by small RNAs for many generations. Planarians are separated from C. elegans by over 500M years. The mechanism for RNAi memory in planarians is entirely unknown and the preliminary results indicate that it differs from the C. elegans mechanism. In a proof-of-concept, the scientists found that planarians maintain RNAi memory for >3 months and over multiple regeneration cycles. Combined with the absence of a clear distinction of parent and progeny in the system, planarians are therefore an intriguing new model system for discovery of new mechanisms for transgenerational epigenetic mechanisms. Together, they want to aim to identify the contributing genes and understand how they collectively generate memory in planarian tissues.

Projektbeteiligte

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