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# Epigenetic regulation of genome function in development and through generations

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## Résumé

Epigenetic components regulate many biological phenomena during development and normal physiology. When dysregulated, epigenetic components can also accompany or drive diseases. One main class of epigenetic components are Polycomb group proteins. Originally, Polycomb proteins were shown to silence gene expression. We found that this function involves the regulation of 3D chromosome folding and we found that Polycomb components can induce the formation of long-distance interactions or chromatin loops. The disruption of one of these loops reduces silencing of a target gene, suggesting that loops may play instructive roles in gene regulation. In addition to silencing, Polycomb-dependent regulation of chromatin organization can induce stable epigenetic memory that can be inherited through cell division but also through generations. Intriguingly, Waddington had performed experiments that were interpreted by some as evidence for epigenetic inheritance. We have revisited these experiments in order to elucidate whether inheritance of acquired traits involves genetic or epigenetic mechanisms. Our results will be discussed.

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