
Hox genes' colinearity during Limb Development

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Abstract

Session : "What is a gene? the gene concept faced to recent advances in genetics, molecular and developmental biology." (Galperin, Deutsch -organizer-, They, Heams)

The vertebrate limb was for many years a model-system for the study of the developmental pattern. It was during the reign of experimental embryology (J.W. Saunders, 1948 ; L. Wolpert, J. Lewis, D. Summerbell, 1975). The genetic approach came some fifteen years later. The genes hox were "pattern formation genes". They included the homeobox, discovered in 1984, and were distributed in four clusters in the vertebrates, put in line with Antennapedia and bithorax complexes in *Drosophila*.

Ed. B. Lewis showed in 1978 that the genes of the bithorax complex obeyed the rule of spatial colinearity. This rule states that "the hox genes were clustered along the chromosome colinear with their domain of action in the thorax and abdomen of the fly". In 1989, TIME became the main parameter. The timing of expression of the hox genes depends on their position in the complex according to the following rule: 3' early; 5' late" (the directions of DNA).

What are the mechanisms underlying the temporal colinearity ? A remarkable synthesis was proposed by Denis Duboule in 1994. But in 2003 the effect of a single "regulatory element over different genes spanning 250 Kb (250.000 bases of DNA)" was the first example of a regulatory domain. The concept of "regulatory landscape" was invented.

We propose to follow the main steps in the future of this concept, essentially in relation to the concept of gene.

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