Abstract

Nucleic acids are considered to be the principal information polymers, yet from genetic information alone, it is impossible to predict the outcome of morphogenesis. Even as our knowledge of biochemical signaling expands, the regenerative mechanisms reconstructing the amphibian limb demand, in addition to the established morphogen model, a more complex framework. In contrast to limb development in regeneration cells' lineage and in the case of connective tissue-derived cells, even positional memory is maintained. The intention of my thesis it to explain the instructive cues provided by the properties of limb tissue at a steady state, such as epigenetic modifications, membrane-bound proteins, composition of extracellular matrix, and mechanical signaling. Cell plasticity is required for limb regeneration, but the precise reproduction of the structure depends on the conservation of pattern. Connective tissue-derived cells retain and relay the positional information to their progeny, and through the expression of surface molecules, the cells sort within the tissue. These superior pattern-forming cells communicate with the pattern-following cells and thus constitute a structured system.

Keywords:

positional information, pattern formation, positional memory, limb regeneration, epigenetic profile, connective tissue cells