



# **EINLADUNG zum ZIH - KOLLOQUIUM**

**Title: Modelling biological pattern formation: solved and unsolved problems**

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**Ort: Max-Planck-Institut für Molekulare Zellbiologie und Genetik, Pfotenhauerstr. 108, Großes Auditorium**

**Abstract:**

Development is usually a surprisingly robust process and proceeds often normally even after severe perturbations. It will be shown that reliable pattern formation is possible by a chain of self-regulating pattern-forming reactions. We proposed molecular feasible interactions that describe essential steps and that account for the observed dynamic regulations. The models are formulated as sets of partial differential equations which describe the synthesis, the spread, the destruction and the interaction of the different substances involved. These models found strong support by more recent observations on the molecular-genetic level. The following steps will be briefly discussed: primary pattern formation and generation of organizing regions by local self-enhancement and long-ranging inhibition, the stable activation of genes under the influence of a morphogen gradient, the generation of positional information for substructures such as legs and wings at differentiation borders, the formation of branched filaments, orientation of cells by chemotactic signals and segment formation.

In more details models for the generation of the two main body axes will be discussed. In vertebrates only a single organizer, the Spemann-type organizer, is assumed to exist. How can a single organizer give rise to two orthogonal axes, AP and DV? Using vertebrates, insects and planarians as example, it will be shown that nature found very different mechanisms to set up the primary body axes and especially to specify the midline, the precondition to form a central nervous system. These differences are proposed to be the branch point in the separation of phyla. (our website: <http://www.eb.tuebingen.mpg.de/meinhardt>)

**gez. Prof. Dr. Wolfgang E. Nagel**