

On the Genetic Plasticity of Viruses – Aspects of a Dynamic Microbiology

Over the last 20 years, genome sequencing techniques and our knowledge of genetic lineages and evolutionary pathways have expanded tremendously. Our image of viruses has changed fundamentally during that time.

From a systems science perspective, viruses in their entirety represent the mediating medium of global genetic communication among organisms.

The genomes of individual organisms are therefore not so much the result of random mutations and their selection, but can be understood as surroundings and context dependent rearrangements of a fundamentally dialogical, integrated, organized system of living things.

From a genetic point of view, viruses are all-rounders; they constantly exchange genetic material among themselves, they mutate, transfer, recombine, replicate, cut, splice, copy, duplicate and repair their genes according to laws whose understanding requires completely new perspectives. In the context of genetic processes, viruses represent the plastic antipole to the relatively stable DNA.

In the course of evolution, over countless developmental steps, their high genetic dynamics, adaptivity and mutability have been internalized and preserved in the extremely complex, intracellular RNA elements of the genetic “text processing” of all living organisms.

The so-called RNA processing and the epigenetic processes mediate between environment and organism as regulators and thus create the biological prerequisite for further development and biodiversity. Their structural elements are derived from viruses. They are primarily genetic pulse generators that open up developmental possibilities for the host organism. Their almost unlimited surplus of diversity merely creates the necessary free space for the inexhaustibly creative natural processes. From this perspective, the pathogenicity of viruses appears as the exception in the case of stress-induced susceptibility to disturbance and the crises of every innovative, living development.