

## The Art of Trojan War – How Cellular Mechanisms Are Exploited by Viruses

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Meeting Report on the 9th Workshop 'Cell Biology of Viral Infections' of the German Society of Virology (GfV) in Deidesheim, September 29th – October 1st 2010.

Viruses are masters of disguise and subversion. They follow a Trojan Horse strategy to enter cells and use them to propagate. As intracellular parasites they have evolved over millions of years to take advantage of cellular mechanisms to support their life cycle as well as to avoid cellular defense mechanisms. In a way, they are THE experts on many cellular mechanisms such as endocytosis, nuclear import, transcription, replication, exocytosis, or apoptosis, signalling, and the innate immune system. Hence, studying virus life cycles implicitly contributes to our understanding of cellular mechanisms. Viruses provide a simple, limited component system that can be easily followed by the molecular biological, biochemical, and microscopical techniques.

To foster exchange and research at the crossroads of cell biology and virology, the German Society of Virology established the study group 'Cell Biology of Viral Infections' a decade ago. The main purpose of this study group is to bring together researchers of the

fields of virology and cell biology by means of informal workshops. Held again on the estates of the famous winery Basserman-Jordan (Deidesheim) in the palatinate region, this year's 9th annual workshop was as again generously co-sponsored by the German Society of Cell Biology. Four cell biological keynote speakers gave exciting insights into their particular research efforts.

*Michael Way* (Cancer Research UK, London) focussed on the various strategies that viruses use to hijack the cellular transport machinery. Using mainly the two poxviruses Vaccinia virus and Yaba-like disease virus as model systems and comparing them to e.g. retroviruses he exemplified the plethora of cytoskeleton interaction modes that are used by viruses at different stages in the life cycle. He showed that this does not only include a 'jump' from one cytoskeletal element to the next, but also that involvement of different motor proteins results in various speeds while using actin-based motility. This tale of actin and actin tails was then completed by spotlighting on some of the less known exit mechanisms that viruses use including the involvement of clathrin lattice sheets.

*Wolfram Antonin* from the Friedrich Miescher Institute in Tübingen zoomed on the nuclear envelope and its assembly and disassembly in the course of the cell cycle. Using the elegant combination of biochemical characterising protein-protein interactions biochemically on one hand and dedicated in vitro systems on the other he focused on the striking structural rearrangements during mitosis. Particularly he emphasized the intriguing mechanisms how nuclear pore complex components are reinserted into the membrane and how their distribution between the outer and inner nuclear envelope is regulated.

*Werner Franke* (DKFZ Heidelberg) revisited the different types of cell junctions. He showed a plethora of examples, where junctional proteins that in textbooks appear to be limited to a defined set of junction types mix and form intermediate or novel kinds of junctional complexes. He also highlighted the use of junctional proteins as diagnostic markers in disease, particularly in certain tumours. The talk was spiced by the intermittent reflections on philosophical and ethical questions that deal with research and researchers.

Finally, *Jürgen Klingauf* from the University of Münster highlighted the various tools and methods for visualizing membrane trafficking at the presynapse. This hotspot of exo- and endocytosis is of considerable interest for neurological and physiological research, but also fundamental basic questions are addressed in this model system. Displaying and explaining a variety of imaging methods from high resolution to superresolution fluorescence microscopy techniques combined with the use of pH-dependent dyes, he elaborated how these modern techniques validate or contradict longstanding models of how the different vesicle pools act in membrane/vesicle retrieval and excitation of signals. His talk resulted in a lively discussion about the many uses of these techniques for analyzing membrane trafficking events in virus infections.

Besides the invited speakers, the participants displayed in a number of talks and posters the wide variety of cell biological features of viral infections. Topics ranged from transport of papillomavirus interactions with



One condiment of good scientific discussions at the meeting – barrels of excellent Riesling wine.

sequence-specific polysaccharides, manipulations of cellular membranes by adenoviruses and herpesviruses, involvement of histone deacetylases in the endocytosis of viruses, transport of papillomaviruses along microtubules, analysis of Influenza A virus induced and modulated signalling, to systems biology approaches to study nucleo-cytoplasmic transport of herpesviral proteins, - just to name a few. On the other hand the participants represented as well a wide expertise in techniques covering a range from specialized life cell imaging at cutting edge speed and sensitivity, small molecule techniques, RNAi screens, high resolution cryo electron microscopy, to dedicated studies in 3D tissues.

Possibly with the help of the excellent Riesling served during the compulsory wine tasting, the meeting proved again to be a platform that stimulated interdisciplinary discussions, provided valuable feedback and served as a nucleation point for a number of new collaborations. It also saw an increased recognition of the value of this interdisciplinary meeting by the European research community. While previous meetings were mostly attended by researchers from Germany, more and more scientists from Switzerland, France, and the United Kingdom joined the meeting. Currently, negotiations with the European Society of Virology are under way to establish this meeting on a European level. As for now, the meeting series will continue as in earlier years though with some change in organization. We have organized the meeting for the last three years, and it was time to pass the torch. New chairs for the meeting have been elected for the following three years period – Susanne Bailer (Munich) and Harald Wodrich (Bordeaux) invite you to this year's 10th workshop that takes place from September 21st-23rd again in Deidesheim. The new organizers would like to emphasize and explicitly extend their invitation to all researchers in fields of cell biology as well as pathogen modulated host cell behaviour to join them in autumn 2011. We are sure that this series of workshops will continue to stimulate interactions between researchers, both, with cell biological and virological interest. For us, the last three years were most rewarding in that in particular young scientists expressed their view that this meeting series would be one of the most helpful, interactive, and scientifically stimulating meeting that they had attended and the numerous successful collaborations initiated at this meeting speak for themselves.

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