

## **A plasmid goes viral: Understanding the origin and evolution of viruses by studying a newly discovered virus-like element.**

Initiative: "Leben?" - Ein neuer Blick der Naturwissenschaften auf die grundlegenden Prinzipien des Lebens

(beendet)

Bewilligung: 06.07.2020

Laufzeit: 3 Jahre

Extrachromosomal elements, such as plasmids or viruses, are ubiquitous in all three domains of life (eukaryotes, bacteria, archaea). Plasmids and viruses can both be considered as selfish genetic elements. However, plasmids can be distinguished from viruses by their lack of genetic information encoding structural proteins that allow cell exit and dissemination in capsids. Recently, the research team discovered the plasmid pR1SE, a novel extrachromosomal element from a hypersaline Antarctic lake exhibiting genomic characteristics of a plasmid, yet which is released from cells like a lipid-enveloped virus by forming membrane-containing capsid-like entities encasing the plasmid and structural proteins. This is the first time this mode of plasmid transfer, relying on so-called plasmid vesicles or plasmidions, has been reported. Plasmidions may represent evolutionary precursors of modern viruses and could thus offer the first direct evidence for the "escape hypothesis" of viral evolution amenable to laboratory investigation. Accordingly, an international team skilled in virology, microbiology, cell biology, genetics, structural biology, and biochemistry will characterize this unique element, comparing observed characteristics with those of lipid-enveloped viruses, thereby addressing the evolutionary relationship of plasmidions to viruses. The proposed research should provide fundamental advances in understanding the origin and evolution of viruses and related extrachromosomal elements, as well as their mechanisms of infection and transmission.

### **Projektbeteiligte**

#### **Dr. Susanne Erdmann**

Max-Planck-Institut für marine

Mikrobiologie

Archaea Virologie

Administrating Institution: MPG. Munich

Bremen

#### **Prof. Dr. Nicole Tischler**

Fundación Ciencia & Vida

Laboratorio de Virologia Molecular

Santiago

Chile

**Dr. Elina Roine**

University of Helsinki  
Faculty of Biological and Environmental Sciences  
Molecular and Integrative Biosciences Research Pro  
Helsinki  
Finland

**Prof. Jerry Eichler**

Ben-Gurion University of the Negev  
Life Sciences  
Beersheva  
Israel

**Prof. Juha Huiskonen**

University of Helsinki  
Laboratory of Structural Biology  
Helsinki Institute of Life Science  
Helsinki  
Finland

**Open Access-Publikationen**

**Halorubrum pleomorphic virus-6 Membrane Fusion Is Triggered by an S-Layer Component of Its Haloarchaeal Host**

**Improving the genetic system for Halorubrum lacusprofundi to allow in-frame deletions**

**Influence of N-Glycosylation on Virus Host Interactions in Halorubrum lacusprofundi**