The virus of my virus is my mutualist – what environmental microbiology teaches us about host-parasite interactions

Viruses are mostly known as pathogens of animals and plants; however, the vast majority of viruses infect microbes, and little attention is paid to the diverse roles that these viruses play in ecology and evolution. As the most abundant biological entities on Earth, viruses are reservoirs of a largely uncharacterized genetic diversity, which is shared through a network of interactions with other microbes and mobile genetic elements. In this seminar, I will highlight some non-canonical host-virus interactions using the example of giant DNA viruses of protists. Microbial eukaryotes are host to a variety of pathogens that include the largest known viruses, such as mimi- and pandoraviruses, which package megabase-long genomes into particles as big as bacterial cells. Giant viruses themselves are parasitized by smaller DNA viruses called virophages. In the marine heterotrophic flagellate Cafeteria roenbergensis, host and virophage exist in a mutualistic relationship, with the host cell allowing the virophage to persist as a provirus, and the virophage protecting the host population from infection by giant viruses. In addition to their presumably widespread ecological impact among protists, virophages represent an evolutionary link between viruses and DNA transposons of eukaryotes. Our findings demonstrate the potential of virus-mediated lateral gene transfer in unicellular eukaryotes and provide the first example of an adaptive defense system in protists.

Host: Stefan W. Hell

Large Seminar Room, Administration Building
Max Planck Institute for Biophysical Chemistry, Am Fassberg 11, 37079 Göttingen