PERSONAL INFORMATION

Family name, First name: **PLEVKA, PAVEL**
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EDUCATION AND WORK POSITIONS

2023 – present, Acting Director; CEITEC, Masaryk University, Brno, Czech Republic.

2013 – present, Research group leader of Structural Virology Lab; CEITEC, Masaryk University, Brno, Czech Republic.

2009 – 2013, postdoctoral research associate with Michael Rossmann; Department of Biological Sciences, Purdue University, West Lafayette, USA.

2004 – 2009, PhD student with Lars Liljas; Department of Cell and Molecular Biology, Uppsala University, Sweden. Thesis title: "Structure of Small Icosahedral Viruses", degree awarded on 2009-05-19.

2002 – 2004, PhD student with Jitka Forstová; Department of Genetics and Microbiology, Faculty of Sciences, Charles University, Prague, Czech Republic.

1997 – 2002, MSc in Virology, Faculty of Sciences, Charles University, Prague, Czech Republic.

SELECTED PUBLICATIONS (underline indicates corresponding author):

1. Šiborová M, Füzik T, Procházková M, Nováček J, Benešík M, Nilsson AS, **Plevka P**. *Tail proteins of phage SU10 reorganize into the nozzle for genome delivery.* **Nat Commun.** 2022;13(1):5622.
2. Hrebík D, Füzik T, Gondová M, Šmerdová L, Adamopoulos A, Šedo O, Zdráhal Z, **Plevka P**. *ICAM-1 induced rearrangements of capsid and genome prime rhinovirus 14 for activation and uncoating*. **PNAS**. 2021;118(19):e2024251118.
3. Škubník K, Sukeník L, Buchta D, Füzik T, Procházková M, Moravcová J, Šmerdová L, Přidal A, Vácha R, **Plevka P**. *Capsid opening enables genome release of iflaviruses.* **Sci Adv.** 2021;7(1)
4. Bárdy P, Füzik T, Hrebík D, Pantůček R, Thomas Beatty J, **Plevka P**. *Structure and mechanism of DNA delivery of a gene transfer agent.* **Nat Commun.** 2020;11(1):3034.
5. Hrebík D, Štveráková D, Škubník K, Füzik T, Pantůček R, **Plevka P**. *Structure and genome ejection mechanism of Staphylococcus aureus phage P68*. **Sci Adv.** 2019; 5(10):eaaw7414.
6. Buchta D, Füzik T, Hrebík D, Levdansky Y, Sukeník L, Mukhamedova L, Moravcová J, Vácha R, **Plevka P**. *Enterovirus particles expel capsid pentamers to enable genome release*. **Nat Commun.** 2019; 10(1):1138.
7. Procházková M, Füzik T, Škubník K, Moravcová J, Ubiparip Z, Přidal A, **Plevka P**. *Virion structure and genome delivery mechanism of sacbrood honeybee virus.* **PNAS.** 2018; 115(30):7759-7764.
8. Füzik T, Formanová P, Růžek D, Yoshii K, Niedrig M, **Plevka P**. *Structure of tick-borne encephalitis virus and its neutralization by a monoclonal antibody.* **Nat Commun.** 2018; 9(1):436.
9. Škubník K, Nováček J, Füzik T, Přidal A, Paxton RJ, **Plevka P**. *Structure of deformed wing virus, a major honey bee pathogen.* **PNAS.** 2017; 114(12):3210-3215.
10. Nováček J, Šiborová M, Benešík M, Pantůček R, Doškař J, **Plevka P**. *Structure and genome release of Twort-like Myoviridae phage with a double-layered baseplate.* **PNAS.** 2016; 113(33):9351-6.

OVERVIEW OF SCIENTIFIC OUTPUT

H-index 22, 65 publications, 1501 citations without auto-citations according to WOS.

PRIZES AND AWARDS

2022 South Moravian Region Award for contribution in the field of science.

2022 MUNI SCIENTISTS award.

2020 Werner von Siemens Prize for the most important discovery in basic research.

2019 Silver Medal of Masaryk University.

2016 Neuron Prize for Young Scientist in Biology, Neuron Foundation.

2014 Rector's Award for Extraordinary International Grant Competition Results.

2002 Prof. Jaroslav Heyrovsky's Prize for the Best Student of Natural Sciences, Charles University.

TEACHING ACTIVITIES AND SUPERVISION OF GRADUATE STUDENTS AND POSTDOCTORAL FELLOWS

From 2013 – 2022 I developed, and I teach three courses: (1) Structural and Molecular Virology, (2) Structural Biology Methods, (3) Publish or Perish, the Art of Scientific Writing. I have supervised ten postdocs, seven PhD students, and five master's students.

INSTITUTIONAL RESPONSIBILITIES / COMMISSIONS OF TRUST

2022 – 2023: Scientific Coordinator of the National Institute of Virology and Bacteriology.

2020 – 2023: Deputy Director for core facilities, CEITEC, Masaryk University.

2016 – 2023: Member of the Scientific Board of CEITEC, Masaryk University, Czech Republic.

2023 – present: Chair of the Scientific Board of CEITEC, Masaryk University, Czech Republic.

SELECTED INVITED LECTURES

Gordon Research Conference - Staphylococcal Diseases 2019. Castelldefels, Spain. Keynote lecture: "Structure and mechanism of genome delivery of tailed phages infecting *S. aureus*."

FEBS meeting in Riga 2019. Riga, Latvia. Invited lecture: "Structure and DNA delivery mechanism of gene transfer agent."

SINOPIC Meeting 2018. Kunming, China. Invited lecture: "Genome release mechanism of enteroviruses."

COMPETITIVE FUNDING AS PRINCIPAL INVESTIGATOR

FP7-ERC-Starting grant: Structural studies of human picornaviruses (grant n_o. 335855). 2014-2019, 1,997,000 Euro.

EMBO-installation grant: Structural studies of human and animal pathogens from the order *Picornavirales* (grant n_o. 3041). 2015-2019, 250,000 Euro.

Czech Science Foundation junior grant: Structural studies of potential phage-therapy agent, *Staphylococcus aureus* phage 812K1-420 (grant n_o. GA15-21631Y). 2015-2017, 308,000 Euro.

Czech Science Foundation grant: Structural studies of flaviviruses and their neutralization by antibodies (grant n_o. GA17-02196S). 2017-2019, 419,000 Euro.

Czech Science Foundation grant: Structural characterization of replication of *Staphylococcus aureus* phage *in vivo* (grant n_o. GA18-17810S). 2018-2020, 396,000 Euro.

Czech Science Foundation EXPRO grant: Structural study of enterovirus replication *in situ* (grant n_o. GX19-25982X). 2019-2023, 1,950,000 Euro.

Czech Ministry of Education, Youth and Sports ERC-CZ Consolidator grant: Phage replication in bacterial biofilm (grant n_o. LL1906). 2020-2022, 2,440,000 Euro.

Horizon Europe-ERC-Consolidator grant: Phage replication in bacterial biofilm (grant n_o. 101043452). 2023-2027, 1,993,000 Euro.

BREAKTHROUGH RESULTS PUBLISHED IN THE LAST 5 YEARS

In a 2019 *Nature Communications* paper (paper 5 listed above), a 2021 *Science Advances* (paper 2 listed above), and a 2021 *Journal of Virology* paper, we described the mechanism of genome release of viruses from the families *Picornaviridae*, *Iflaviridae*, and *Dicistroviridae* that are the most common pathogens of humans, animals, and insects, including honeybees. We used cryo-electron microscopy to visualize virions of human echovirus 18, deformed wing virus, and Kashmir bee virus in the process of genome release. We discovered that the RNA's exit from the virus particles results in a loss of one, two, or three adjacent capsid-protein pentamers. The capsid's opening, which is more than 120 Å in diameter, enables the release of the genome without the need to unwind its putative double-stranded RNA segments. We determined that conformational changes and expansion of the virus RNA genomes induced by an acidic pH trigger the opening of virus particles. Our findings uncovered a mechanism of enterovirus genome release that could become a target for antiviral drugs.

In a 2018 *Nature Communications* paper (paper 7 listed above), we reported the virion structure and mechanism of neutralization of tick-borne encephalitis virus (TBEV) by a monoclonal antibody. The virus causes 13,000 cases of human meningitis and encephalitis annually. Flavivirus genome delivery depends on membrane fusion that is triggered at low pH. The virion structure indicates that the repulsive interactions of histidine side chains, which become protonated at low pH, may contribute to the disruption of heterotetramers of the TBEV envelope and membrane proteins and induce detachment of the envelope protein ectodomains from the virus membrane. The Fab fragments bind to 120 out of the 180 envelope glycoproteins of the TBEV virion. Unlike most of the previously studied flavivirus-neutralizing antibodies, the Fab fragments do not lock the envelope proteins in the native-like arrangement but interfere with the process of virus-induced membrane fusion.