

Curriculum Vitae – Klára Hlouchová, Ph.D.

Date of birth 06.08.1981, Třebíč, Czech Republic
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Career

2019-present **Assistant Professor** at Charles University Prague (Department of Cell Biology)
2017- 2019 **Junior Group Leader** at Charles University Prague (Department of Biochemistry)
2016 **Research Associate** at Charles University Prague
2014-2015 Career break (second parental leave)
2011 – 2013 **Postdoctoral Research Associate**, University of Colorado Boulder, USA
(laboratory of Prof. Shelley Copley, theme: Molecular evolution of enzymes and metabolic pathways)
2009-2010 CAREER BREAK (first parental leave)
2005 – 2009 **PhD student** at IOCB, Czech Academy of Science (lab of Prof. Jan Konvalinka)
2006 & 2008 **Visiting Scientist** at National Cancer Institute, Frederick, USA
(two one-month research stays, Macromolecular Crystallography Laboratory, group of Dr. Jacek Lubkowski)

Academic Degrees

2009 **PhD** with Prof. Jan Konvalinka, IOCB, Czech Academy of Science and Charles University, Czech Republic
2005 **MSc** in Biochemistry, Charles University, Prague, Czech Republic

Research Interests

- Design and characterization of proteins/protein combinatorial libraries from canonical/reduced/unnatural amino acids by methods of synthetic biology
 - In vitro forward/reverse protein evolution
 - Re/construction of minimal biochemical systems
- to study evolution of protein structure and function, early origins of life and RNA/protein coevolution

Invited talks

July 2020 Molecular Origins of Life, Munich, Germany (online)
May 2018 Seminar Series: Frontiers in Ecology and Evolution, University of Muenster, Germany
January 2017 Seminar Series: Modern Concepts in Structural Biology, University of Vienna, Austria
January 2016 GRC on Origins of Life, Galveston TX, USA

Societal engagement

November 2020 podcast at Brain We Are CZ about astrobiology/origins of life/synt bio
April 2018 Public talk about astrobiology at the Brno Planetarium as part of the lecture series on Origins of Life
2016-2019 science club at a local primary school (grade 1-5)

Publications

h-index is 10, papers are cited ~300 times (20 times on average)

Makarov M, Meng J, Tretyachenko V, Srb P, Březinová A, Giacobelli VG, Bednárová L, Vondrášek J, Dunker AK and **Hloučová K**. Enzyme catalysis prior to aromatic residues: reverse engineering of a dephosphoCoA kinase. *Under review in FEBS J*

Bornberg-Bauer E, **Hloučová K**, Lange A. (2020) Structure and function of naturally evolved de novo proteins. *Current Opinions in Structural Biology*. In Press

Tretyachenko V, Voráček V, Souček R, Fujishima K, and **Hloučová K**. (2020) CoLiDe: Combinatorial Library Design tool for probing protein sequence space. *Bioinformatics* DOI: 10.1093/bioinformatics/btaa804

Vymětal J, Vondrášek J, and **Hloučová K**. (2019). Sequence Versus Composition: What Prescribes IDP Biophysical Properties? *Entropy*, 21(7), 654.

Tretyachenko V, Vymětal J, Bednárová L, Kopecký V, Hofbauerová K, Jindrová H, Hubálek M, Souček R, Konvalinka J, Vondrášek J, and **Hloučová K**. (2017) Random protein sequences can form defined secondary structure and are well-tolerated in vivo. *SciRep* 7, 15449.

Navrátil M, Tykvar J, Schimer J, Páchl P, Navrátil V, Rokob TA, **Hloučová K**, Rulíšek L & Konvalinka J. (2016) Comparison of the substrate specificity of human glutamate carboxypeptidases II and III: A kinetic, X-ray and QM/MM study. *FEBS J*. **283**, 2528-45.

Yadid I, Rudolph J, **Hloučová K**, & Copley SD. (2013) Sequestration of a highly reactive intermediate in an evolving pathway for degradation of pentachlorophenol. *Proc Natl Acad Sci US A*. 110, E2182-90.

Hloučová K, Rudolph J, Pietari JMH, Behlen LS, & Copley SD (2012) Pentachlorophenol hydroxylase, a poorly functioning enzyme required for degradation of pentachlorophenol by *Sphingobium chlorophenolicum*. *Biochemistry* **51**, 3848-60.

Hloučová K, Navrátil V, Tykvar J, Šácha P & Konvalinka J. (2012) GCPII variants, paralogs and orthologs. *Curr Med Chem* **19**, 1316-22.

Hloučová K, Bařinka C, Konvalinka J & Lubkowski J (2009) Structural insight into the evolutionary and pharmacologic homology of glutamate carboxypeptidases II and III. *FEBS Journal* **276**, 4448-4462.

Rovenská M, **Hloučová K**, Šácha P, Mlčochová P, Horák V, Zámečník J, Bařinka C, Konvalinka J (2008) Tissue expression and enzymologic characterization of human prostate specific membrane antigen and its rat and pig orthologs. *Prostate* **68**,171-82.

Bařinka C, **Hloučová K**, Rovenská M, Majer P, Dauter M, Hin N, Ko YS, Tsukamoto T, Slusher BS, Konvalinka J & Lubkowski J (2008) Structural Basis of interactions between human glutamate carboxypeptidase II and its substrate analogs. *J Mol Biol* **376**, 1438-50.

Bařinka C, Rovenská M, Mlčochová P, **Hloučová K**, Plechanovová A, Majer P, Tsukamoto T, Slusher BS, Konvalinka J & Lubkowski J (2007) Structural insight into the pharmacophore pocket of human glutamate carboxypeptidase II. *J Med Chem* **50**, 3267-73.

Šácha P, Zámečník J, Bařinka C, **Hlouchová K**, Vícha A, Mlčochová P, Hilgert I, Eckschlager T & Konvalinka J (2007) Expression of glutamate carboxypeptidase II in human brain. *Neuroscience* **144**, 1361-72

Hlouchová K, Bařinka C, Klusák V, Šácha P, Mlčochová P, Majer P, Rulíšek L & Konvalinka J (2007) Biochemical characterization of human glutamate carboxypeptidase III. *J Neurochem* **101**, 682-96.

Book Chapters

Hlouchová K, Bařinka C & Konvalinka J (2011) Glutamate carboxypeptidase II as a therapeutic target. In: Proteinases as drug targets. Ben Dunn ed., RSC Publishing

Scientific Community Activities

Scientific Reports and *Journal of the Royal Society Interface* editorial board member

Teaching activities

Seminar *Synthetic Biology 2019-2020*

Lecture Series *Protein Engineering and Synthetic Biology 2020-2021*

Supervision of 6 PhD and 2 undergraduate students (6 undergraduate theses successfully defended)

Overview of fellowships and grants

Title *Ghost in the protein: how do new proteins come about?*

Team: Prof. Erich Bornberg-Bauer at University of Muenster Germany (PI), Klara Hlouchova (Co-PI), Prof. Florian Hollfelder, University of Cambridge, Great Britain (Co-PI), Prof. Ylva Ivarsson at Uppsala University, Sweden (Co-PI)

Duration: 1/2021-12/2025

Funding body: **Volkswagen Stiftung**

Title *In vivo response to unevolved protein sequences: systematic mapping of fitness landscape*

Duration: 01/2020-12/2022

Funding body: Charles University **Primus**

Title *Exploration of the structure/function space of prebiotic to biological proteins*

Team: Klara Hlouchova (PI), Kosuke Fujishima at ELSI/Tokyo Tech Japan, Stephen Fried at Johns Hopkins USA

Duration: 06/2019-05/2022

Funding body: **Human Frontiers Science Program**

Title *Terrestrial protein sequence and structure space evolution*

Duration: 2017-2019 (finished)

Funding body: **Czech Science Foundation**

Relation: includes work on random protein sequences but no overlap with this proposal

Fellowship:

Cooperative Institute for Research in Environmental Sciences Postdoctoral Fellowship

Title: Planetary metabolism

Duration: 2011-2012

Vatican Observatory Foundation Fellowship to attend Vatican Observatory Summer School

Theme: Astrobiology

Duration: June-July 2005

October 30, 2020