

The prestigious Rudolf Lukeš Prize for 2024 goes to scientist Martin Marek for his research on marine bioluminescence, which can inspire environmentally friendly light sources

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The Rudolf Lukeš Prize, awarded by the Czech Chemical Society in cooperation with the Experientia Foundation, goes this year to Martin Marek from the Faculty of Science at Masaryk University in Brno for his significant contributions to the field of bioorganic chemistry related to marine luminescence. In his work, the award-winning scientist focuses on protein catalysts responsible for light production by living organisms, a phenomenon known as bioluminescence. *"Until recently, we had no idea what marine protein catalysts looked like or how they generate light. It is into this unexplored area that we have directed our research efforts to unravel the principles of bioluminescence at the molecular level. We are delighted that our research has contributed to understanding the structure and function of these extraordinary enzymes and thus continue to write a fantastic story in science and technology,"* explains Martin Marek.



Photo: Barbora Mráčková

Global climate change, along with the current energy crisis, is motivating humanity to seek new sources of light that are both sustainable and environmentally friendly. Scientists are inspired by organisms living on the seabed and ocean floor that can produce light, known as bioluminescence. Luminous species have been discovered in at least 700 genera of organisms, including bacteria, arthropods, mollusks, crustaceans, echinoderms, tunicates, and fish. Today, bioluminescence is applied in basic research, non-invasive biological imaging, and biosensor development. *"In the future, however, bioluminescence could be used to create environmentally friendly light sources with zero electricity consumption,"* says scientist Martin Marek, this year's winner of the Rudolf Lukeš Prize.



Photo: Barbora Mráčková

Martin Marek's research group at the Faculty of Science at Masaryk University in Brno studies protein catalysts that enable organisms to generate light through the biochemical transformation of small, high-energy organic molecules. *"We have succeeded in elucidating the crucial chemical steps in the bioluminescence process. We have shown where and how an energy-rich molecule called luciferin binds within the enzyme,"* explains Martin Marek. Additionally, his team can use X-ray crystallography to visualise the structures of these extraordinary enzymes, known as luciferases, even at different stages of catalysis. *"This has allowed us to describe in detail the chemical reaction that produces light in the enzymes,"* says Martin Marek. Moreover, by understanding the entire process, the research group at Masaryk University can now "tune" the enzymes to generate light of the desired wavelength or with a targeted light length. *"The results of our work are advancing knowledge in the field of bioorganic chemistry, but they also have the potential to inspire a variety of technological and industrial solutions for a sustainable future,"* adds the award-winning scientist.

The Rudolf Lukeš Prize (for an outstanding collection of original papers in the field of organic chemistry published in the last five years in prestigious international journals), along with an endowment contribution of CZK 100,000 from the Experientia Foundation, will be awarded to Martin Marek in November at the conference Advances in Organic, Bioorganic and Pharmaceutical Chemistry – Liblice 2024. The prize winner was selected from a strong pool of competitors by an independent international committee of distinguished chemists. *"I see the award as excellent feedback that our work is meaningful. I also view it as a highlight of the importance of my entire field. Thanks to the Rudolf Lukeš Prize, bioluminescence will become*

more widely recognized by both the professional and lay public," says Martin Marek, the recent laureate.

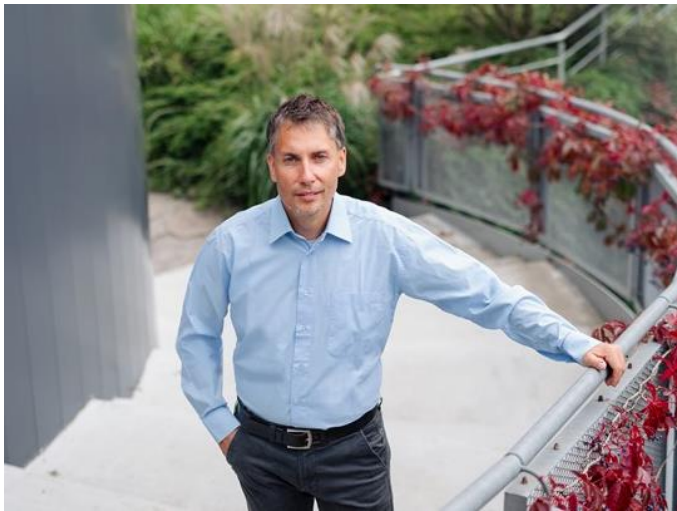


Photo: Barbora Mráčková

Ing. RNDr. Martin Marek, Ph.D., MBA, is a graduate of Charles University and the Czech University of Agriculture in Prague, where he received his Ph.D. in phytopathology and plant protection. Martin completed research stays and long-term postdoctoral fellowships at Wageningen University (the Netherlands), Généthon (France), and the Institute of Molecular and Cellular Biology and Genetics (France). Today, he leads the Structural Biology Group within the Loschmidt Laboratories at

the RECETOX Research Institute of Masaryk University in Brno, as well as at the International Clinical Research Centre (ICRC) of St. Anne's University Hospital (FNUSA) and the Faculty of Medicine of Masaryk University. More information about Martin Marek's research group can be found [here](#).

More information about the Rudolf Lukeš Prize can be found on the website of the [Experientia Foundation](#).

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