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Merck KGaA, Darmstadt, Germany, and Transylvanian Institute of Neuroscience Cooperate on Brain-Inspired Artificial Intelligence

- **Three-year collaboration in fundamental research**
- **Partners to conduct research on the fundamental principles of intelligence**

Darmstadt, Germany, February 24, 2021– Merck KGaA, Darmstadt, Germany, a leading science and technology company, today announced a three-year collaboration with the Transylvanian Institute of Neuroscience (TINS), based in Cluj-Napoca, Romania. The primary focus of this collaboration between the private non-profit research institute TINS and the Artificial Intelligence (AI) Research Team of Merck KGaA, Darmstadt, Germany, will be on improving the understanding of how information processing works in the human brain.

“A deeper understanding of the brain’s computational mechanism will be key to overcoming many of the current limitations in existing artificial intelligence technologies,” said Helmut Linde, Global Head of Data Science at Merck KGaA, Darmstadt, Germany. “With our academic research collaborations, we can ensure that we will be among the first companies to benefit from new outcomes in the rapidly evolving field of AI.”

“If there is one key structure in the brain that holds the answer to intelligence, it’s probably the neocortical microcircuit—a 1 cubic-millimeter building block of gray matter,” said Raul C. Mureşan, President and Principal Investigator at TINS. “The project will investigate the structural and dynamic properties of this building block,



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inspired by experimental evidence gathered in past decades. We will attempt to extract the fundamental principles of the neocortical fabric and translate them into novel computational models. This research endeavor may have a deep impact on our understanding of the mechanisms supporting intelligence and could enable the technologies of tomorrow.”

The study conducted by both partners aims to analyze brain activity at different scales and its relevance for computational capabilities. One objective is to unravel the function of the neocortical microcircuit by developing a theoretical framework that links together fractal structures and dynamics, recurrent neural circuits and brain oscillations to achieve invariant coding and representations. The joint research project should lead to a better understanding of the computational principles employed by the human brain, in particular the neocortex, which is associated with all functions of higher intelligence and is hypothesized to employ one ‘cortical algorithm’ as a common framework to solve seemingly very different tasks, such as image recognition or motion planning. Results of this fundamental research project will be published.

The interdisciplinary AI Research Team at Merck KGaA, Darmstadt, Germany, concentrates on exploring neuroscience-inspired approaches to novel methods for artificial intelligence. These efforts in software development complement the company’s research activities regarding neuromorphic computer chips and could bolster its position as a major supplier to the semiconductor industry in its Performance Materials business sector.

Scientists from TINS have broad experience in experimental and theoretical neuroscience. TINS was the winner of the [2020 Research Grant](#) in ‘Next Generation Machine Learning’. Merck KGaA, Darmstadt, Germany, started awarding research grants for the first time in 2018 during its 350th anniversary year.

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About the Transylvanian Institute of Neuroscience

The Transylvanian Institute of Neuroscience (TINS) is a private, non-profit research institute founded by neuroscientists. Its main mission is to further neuroscientific research by studying the dynamics of neural circuits in health and disease. TINS also focuses on research in cognitive sciences and brain-inspired artificial intelligence. TINS is located in Cluj-Napoca, a vibrant university city in the heart of Transylvania. TINS was founded in October 2017 with the purpose of providing the institutional framework necessary for the advanced experimental research of the function of neural circuits. At present, multiple research labs operate at TINS, benefiting from an exceptional experimental and computational infrastructure.

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About Merck KGaA, Darmstadt, Germany

Merck KGaA, Darmstadt, Germany, a leading science and technology company, operates across healthcare, life science and performance materials. Around 58,000 employees work to make a positive difference to millions of people's lives every day by creating more joyful and sustainable ways to live. From advancing gene editing technologies and discovering unique ways to treat the most challenging diseases to enabling the intelligence of devices – the company is everywhere. In 2019, Merck KGaA, Darmstadt, Germany, generated sales of € 16.2 billion in 66 countries.

The company holds the global rights to the name and trademark "Merck" internationally. The only exceptions are the United States and Canada, where the business sectors of Merck KGaA, Darmstadt, Germany operate as EMD Serono in healthcare, MilliporeSigma in life science, and EMD Performance Materials. Since its founding 1668, scientific exploration and responsible entrepreneurship have been key to the company's technological and scientific advances. To this day, the founding family remains the majority owner of the publicly listed company.