Laudatio for Prof. Dr. Kai Simons

By Prof. Dr. Hans-Georg Kräusslich

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If you know Kai Simons for a long time, you may have asked yourself whether the long-term study of membranes and their lipids alone is already sufficient to remain forever young, forever active and forever dynamic. It is certainly not enough; you also need good genes, constant activity and most importantly you need to enjoy what you are doing. Kai Simons embodies all these traits and especially a passion for science and for the process of discovery. This is something he vividly transmits in every lecture, in every scientific discussion and in every meeting.

Kai Simons comes from Finland, but works and lives in Germany for 40 years. He studied medicine in Helsinki, but decided rather early – during his postdoc years at Rockefeller University – to focus on biochemistry. He never lost interest in medical relevance and potential applications, however, and has founded a biotech company after retiring from his active research position in 2012. Main aim of this company is to develop and apply novel lipid biomarkers for medicine.

The scientific focus of his career has been the composition, organization and function of lipid membranes in biomedicine. He started with this topic as a group leader in Helsinki and continued this path of research in the following decades at EMBL and since 1998 as director at the Max-Planck-Institute in Dresden. During these many years he almost reinvented membrane research on several occasions. Essential feature of his early research approach was the use of viruses in cell biology. Viruses have learned to make optimal use of cells during evolution and thus are expert teachers of cell biology. Kai Simons and his colleagues chose Semliki Forest Virus as their pet study subject, which was particularly well chosen as it can easily be amplified, it is not dangerous, but extraordinarily efficient. Research on Semliki Forest Virus led to several fundamental discoveries: how is the viral membrane put together and how do viruses enter living cells? Working together with Ari Helenius in particular, Kai Simons made seminal contributions to our understanding of endocytotic uptake and membrane fusion. These two Finns dominated the area so extensively that many people believe the Semliki Forest to be a Finnish forest; it is

located in Uganda, however.
Advancing his research agenda was always accompanied by developing and improving biochemical methods to enable new experimental approaches and to make new discoveries. This included working with different detergents for membrane extraction in the early years, the mechanical isolation of the top plasma membrane from adherent cells and later the identification and quantitation of the multitude of lipids by mass spectrometry. Kai Simons either developed such novel techniques together with his coworkers or he adapted them early for his research question. Development and application of new technologies for his central question of fundamental importance has been important throughout his career.

Kai Simons is most famous for the concept of „lipid rafts“, little membrane structures in dynamic equilibrium with the rest of the membrane that are crucial for signal transduction, virus infection and many other processes. This line of research was also guided by viruses: why do some viruses assemble and bud at the top surface of a cell, while others go to the bottom surface; what is the cause of this asymmetry? The lipid raft concept and especially the hypothesis that lipids may organize membranes rather than being inert components met with much opposition and has been controversially discussed for many years. Supported and modified by many subsequent scientific discoveries, this concept is now part of every textbook and common knowledge, however.

Kai Simons always has been organizing science besides being a scientist himself. In the early years of EMBL, where he was recruited as a young group leader, he was instrumental in shaping and developing the globally renowned cell biology program. Together with his colleagues from EMBL he later built a special Max-Planck-Institute in Dresden, which is highly attractive especially for young researchers. He founded and led the “European Life Sciences Organization” (ELSO), which served as a new discussion forum for scientists from a multitude of disciplines and which was important for the foundation of the “European Research Council” ERC. Kai Simons always lived and worked in an international environment and has always fought for open international research without borders. Considering this, it is little surprise that he spoke out publicly and with great emphasis and conviction against Pegida and other nationalist developments in Germany, advocating a common European home. We are all grateful to him for this!

Obviously, Kai Simons received many awards. He is member of the Leopoldina, foreign member of the US National Academy of Sciences, he received several honorary doctorates and

numerous awards, which are far too many to name them here. The Robert-Koch-Medal in Gold is awarded for an exceptional lifetime achievement. Despite being incomplete, this short summary certainly shows that the Robert-Koch-Foundation could not have chosen a better awardee than Kai. His lifetime achievement in science, in organization of science and in communication of science is absolutely outstanding. I congratulate Kai to this prestigious award and I do this also in the name of all members of our joint Transregio-SFB, for which Kai has been one of the founding fathers and a constant motor – congratulations and all my best wishes!