Gottfried Schatz (1936–2015)— mitochondrial pioneer and ambassador for science

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Gottfried (“Jeff”) Schatz pioneered the field of mitochondrial biogenesis and many of his discoveries on how mitochondria form and proliferate can be found in the textbooks of today’s students. However, Jeff was much more than an unusually gifted scientist and mentor. He was a brilliant speaker, a talented musician, a successful essayist and novelist, a tireless ambassador for basic science, and a deeply cultured person. With his passing on 1 October 2015, biological science has lost one of its most visible advocates, and many of us have lost a remarkable and warm-hearted friend.

Jeff was born in 1936 in a small Austrian village near the Hungarian border but soon moved to Graz, where he studied chemistry while also pursuing his second passion as a violinist. Music remained a constant pleasure throughout his life. Following his Ph.D. in chemistry from the University of Graz, he joined the University of Vienna, where he began studying mitochondria in yeast, inspired by the work of David Green. In 1964, he demonstrated using biochemical fractionation that mitochondria contain their own DNA. This seminal finding provided the framework for his research for the next four decades, during which he systematically deciphered how mitochondrial proteins are synthesized and assembled to create functional organelles. After postdoctoral work with Efraim Racker in New York, he served as professor of biochemistry at Cornell University for six years, before moving in 1974 to the newly founded Biozentrum of the University of Basel in Switzerland. There

Professor Gottfried Schatz. Photograph courtesy of Merete Schatz, Reinach, Switzerland.

he and his group embarked on a comprehensive analysis of mitochondrial biogenesis.

Jeff’s discovery of mitochondrial DNA helped to place these organelles at center stage and provided key support for the endosymbiont hypothesis of eukaryotic evolution. Jeff demonstrated that mitochondria cannot form *de novo*, but instead arise by growth and division of preexisting mitochondria. Because only a small fraction of mitochondrial proteins are encoded in the

mitochondrial genome, his attention turned to the mechanism by which mitochondrial proteins are assembled into the organelle. Coincident with the discovery of signal peptides for protein sorting to the rough ER, the Schatz laboratory found that most mitochondrial components are synthesized as precursor proteins on cytosolic ribosomes, and are subsequently imported into mitochondria and processed to mature functional polypeptides. Jeff then asked how polypeptides cross the mitochondrial membranes and find their way to the correct destinations within this complex organelle.

Jeff and his group used all of the tricks of the trade to dissect the signals that guide precursor proteins to mitochondria, and to identify the machinery that decodes these signals to facilitate passage through the mitochondrial membranes. Ground-breaking discoveries were the identification of amino-terminal presequences as mitochondrial import signals, and the finding that precursor proteins traverse the outer and inner mitochondrial membranes in an unfolded state. Jeff’s lab identified molecular chaperones that assist folding and assembly of newly imported proteins, as well as degradation systems that purge the organelle of misfolded proteins. All this progressed in parallel with equally exciting work from the laboratory of Walter Neupert in Munich and Jeff enjoyed the friendly rivalry, which sharpened the science of both groups. He loved the fast pace of the young, competitive field of molecular cell biology, but he never lost sight of the goal of pursuing scientific truth. His ability to

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DOI 10.15252/emboj.201593299 | Published online 26 October 2015

maintain this healthy perspective while staying at the top of his profession was truly impressive.

Jeff's contributions were recognized by numerous awards and prizes including the Otto Warburg Medal of the German Biochemical Society (1988), the Louis Jeantet Prize for Medicine (1990), the Prix Marcel Benoist (1993), the Gairdner Award (1998), the Wilson Medal of the American Society for Cell Biology (2000), and the Antonio Feltrinelli International Award (2004). He was an elected member of many societies and academies including the U.S. National Academy of Sciences, the Royal Swedish Academy of Sciences, and the American Academy of Arts and Sciences. He also served as Secretary General of EMBO (1984–1989) and on numerous advisory boards and panels at EMBO and beyond.

Jeff could seemingly excel at anything he put his mind to. Prompted by a restless drive to take on new challenges, he embarked on

a second career as a science politician, public lecturer, and writer. As president of the Swiss Science and Technology Council (2000–2003), he fought for better conditions and a structured career path for young scientists and junior faculty. His talent for communication was as effective with school children as with industrial CEOs, and he took delight in sharing his insight and knowledge about science on all levels. Jeff gave lectures of uncanny lucidity, with a charm and humor that captivated the audience. He wrote essays that conveyed the fascination of research to other scientists and to lay readers, and in articles and interviews with the media, he campaigned for the value of basic science. He was a champion for creativity and excellence in research, stressing the role of the individual rather than anonymous teams and networks. He urged European universities to look beyond ossified traditions and embrace change. Jeff believed that science, which in

his opinion had become disconnected from mainstream society, was a key part of our cultural heritage, and that researchers have an obligation to leave the ivory tower and explain their world view to the general public. In one of his last major projects, Jeff published a novel that built on his experiences as a scientist and observer of humanity in Europe and America.

With all of that ambition and accomplishment, Jeff kept his family as the top priority. He viewed every part of his life as quality time. Jeff was unmatched as a role model, and his many trainees can continue to take inspiration from his advice that they too can make contributions of lasting impact if, in Jeff's words, they show enough passion, courage, and patience!

Acknowledgements

We thank Dr. Susan M. Gasser (Friedrich-Miescher-Institute, Basel, Switzerland) for her invaluable input on the manuscript.