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RNA around the clock – Volker A. Erdmann in memmoriām



Professor Volker A. Erdmann
with Alex Rich's 3-D model of tRNA

On September 11, 2015 we lost our colleague and dear friend Professor Volker A. Erdmann from Institute of Chemistry – Biochemistry, Freie Universität Berlin. He was born on February 8, 1941 in Stettin (now Szczecin, Poland), and later became U.S. citizen. In 1963 he earned his B.A. in Chemistry and in 1966 M.Sc. in Biochemistry from University of New Hampshire in Durham. From 1966 to 1969 he worked at Max-Planck-Institut für experimentelle Medizin, Göttingen, and Technische Universität Braunschweig and got Dr. rer. nat. degree in Biochemistry with minors in Chemistry and Microbiology. In 1971 after an NIH postdoctoral fellowship with Prof. M. Nomura at University of Wisconsin, USA, he became a research group leader at the Max-Planck-Institut für Molekulare

Genetik in Berlin at the Department led by Prof. H.G. Wittmann. In 1978 Volker did Habilitation in Biochemistry and Molecular Biology at the Freie Universität at Berlin.

Since 1980 he was full professor of Biochemistry in the Department of Chemistry at the Institute of Biochemistry, and from 2009 he worked a guest Professor at the Free University of Berlin. In 1987 he received an award for scientific excellence from the German Research Council (DFG), the highest scientific award given in Germany (Förderpreis für deutsche Wissenschaftler im Gottfried Wilhelm Leibniz Programm der Deutschen Forschungsgemeinschaft). He was a member of the Berlin-Brandenburgische Akademie der Wissenschaften (Berlin Brandenburg Academy of Science). In 1994 he was elected Foreign Member of the Polish Academy of Sciences.

His research interests have always been in the area of gene expression with special emphasis in the structure and function of ribosomes and RNA technologies. His RNA research includes studies on the structure and function of ribozymes, antisense oligonucleotides, siRNAs, micro RNAs, DNazymes, high affinity RNA molecules (aptamers),

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enantiomeric catalytic nucleic acids (ribozymes and DNAzymes) and large noncoding RNAs, like the H19 RNA. With his group at Free University he developed methods for the chemical synthesis of RNA molecules, including a large number of modified nucleotides. He has also concentrated on the crystallization of RNA molecules and their protein complexes by X-ray analysis. These crystallization experiments include microgravity experiments (participation in 17 space missions). The results of Volker's research have been published in more than 450 publications. He created data bases on 5S ribosomal RNA and non-coding RNAs. He obtained 14 patents in the area of RNA technologies. He and his colleagues founded in 1998 the Berlin Network for RNA Technologies, with the goal to pursue the structural and functional potentials of RNA molecules.

Volker's most important discoveries include the first total reconstitution of bacterial 50S and 70S ribosomes, first identification of ribosomal 5S RNA binding proteins and 5S RNA protein complexes, first crystallization of ribosomes, first to crystallize RNA molecules under microgravity conditions, first crystallization and X-ray structural determination of a mirror image RNA structure, first to discover mirror image aptamers and first to discover mirror image L-catalytic nucleic acid as alternatives to siRNAs and microRNAs to cure cancer and viral infections.

These L-form aptamers have a number of advantages when compared with D-aptamers. They are very stable in human sera and cells. Since nature does not make L-nucleic acids, there was no need to develop any enzymes hydrolyzing the L-form of nucleic acids. L-aptamers can be compared with protein antibodies, and indeed aptamers can assume very similar functions to antibodies. Aptamers are considerably smaller than antibodies and they are easily synthesized by nucleic acid synthesizers. They are not toxic or immunogenic and therefore most likely ideally suited for the development of new types of pharmaceutical drugs. The development of mirror image catalytic RNA opened new possibilities in basic research and in the area of molecular evolution. Volker A. Erdmann was one of the first Editors-in-Chief and founders of RNA Biology a journal published by Landes Bioscience, Georgetown, Texas (USA). He was co-editor of several books in the series "RNA Technologies" published by Springer. In 2013, he established a private-biotech company called Erdmann Technologies based in Berlin.

Married to Hannelore Erdmann, he had two children (Jörn, and Gabriele). Volker was a very quiet and kind person and very supportive of young scientists. He directed his students and fellow researchers carefully and with pride. He derived much pleasure from the successes of his scientific offspring-his former students. His influence extended well beyond his scientific contributions to shaping policy on important issues at the interface between science and society. He was a great friend of Poland where he visited many laboratories, especially in Poznań and Warsaw. He was a source of inspiration to all around him, and will be greatly missed.