Biochimica et Biophysica Acta 1817 (2012) 267–268

Contents lists available at SciVerse ScienceDirect

Biochimica et Biophysica Acta

journal homepage: www.elsevier.com/locate/bbabio

Michael I. Verkhovsky (1953–2011)

Michael I. Verkhovsky passed away on 04.10.2011 broken by a malignant disease.

Misha was born in Ukraine, former USSR, in 1953. He received his Master's degree in biophysics at the Lomonosov Moscow State University in 1975, and his PhD in 1981 at the same university on work concerning the primary reaction mechanisms of bacterial photosynthesis in bacterial reaction centers, under the direction of Prof. Andrei B. Rubin. From 1989 onwards, he worked as a research scientist on bacterial bioenergetics at the Belozersky Laboratory of Molecular Biology and Bioorganic Chemistry at Moscow State University, headed by Prof. Vladimir P. Skulachev. In 1991, he was invited to the Helsinki Bioenergetics group to join our work on the molecular mechanisms of proton translocation by respiratory enzyme complexes, cytochrome *c* oxidase in particular. Misha and his wife Marina moved to Finland with their two children, which was to be the beginning of 20 years of fruitful collaboration and warm friendship.

Very early on Misha expertly attacked the fast electron and proton transfer reactions of respiratory enzyme with his outstanding knowledge and feel for kinetics, and his great talent for developing opto-electronic instruments [1,2]. This included a paper published in *Nature* on the high affinity of the respiratory enzyme for oxygen, on which one of the reviewers' comments was — "textbook stuff" [3]. Simultaneously with this work, he developed further the electrometric technique that had originated in Moscow, to make it applicable for measurements of translocation of electrical charge across biological membranes with submicrosecond time resolution [4]. This technique has subsequently been a key instrument in helping us understand the molecular mechanisms that underlie charge separation – and thus energy transduction – in cellular respiration [5,6]. Misha's great talent for spectroscopy and kinetics also led to his discovery of the nanosecond quantum-mechanical electron tunneling between the heme groups in the respiratory heme-copper oxidases [7,8], and to the unprecedented measurements of electron transfer in real time along the 100 Å array of iron–sulfur centers in respiratory Complex I [9]. In 2008 he published a valuable and widely cited review article on the structure and function of cytochrome *c* oxidase [10], and very recently he made an important contribution to the studies of the proton motive function of the cytochrome *bd*-type oxidases [11].

Misha was appointed professor at Helsinki University for the period 1996–2006, first at the Department of Medical Chemistry and later at the Institute of Biotechnology, and from 2005 he has been Group Leader at the Institute. He supervised several doctoral theses in Helsinki, and hosted a large number of foreign scientists in his laboratory, who benefitted from his outstanding experimentation and instrumentation skills.

Misha is grieved by his wife, Dr. Marina Verkhovskaya, and his two children Anatoly and Valeria. His untimely death at the peak of his very active scientific career is a great loss to the international science community, and especially to the Institute of Biotechnology and University of Helsinki.

References

[1] M.I. Verkhovsky, J.E. Morgan, M. Wikström, Intramolecular electron transfer in cytochrome *c* oxidase; a cascade of equilibria, Biochemistry 31 (1992) 11860–11863.
[2] M.I. Verkhovsky, J.E. Morgan, M. Wikström, Control of electron delivery to the oxygen reduction site of cytochrome c oxidase: a role for protons, Biochemistry 34 (1995) 7483–7491.
[3] M.I. Verkhovsky, J.E. Morgan, A. Puustinen, M. Wikström, Kinetic trapping of O_2 in cell respiration, Nature 380 (1996) 268–270.

doi:10.1016/j.bbabio.2011.11.004

[4] M.I. Verkhovsky, J.E. Morgan, M.L. Verkhovskaya, M. Wikström, Translocation of electrical charge during a single turnover of cytochrome *c* oxidase, Biochim. Biophys. Acta 1318 (1997) 6–10.
[5] M.I. Verkhovsky, A. Jasaitis, M.L. Verkhovskaya, J.E. Morgan, M. Wikström, Proton translocation by cytochrome *c* oxidase, Nature 400 (1999) 480–483.
[6] I. Belevich, M.I. Verkhovsky, M. Wikström, Proton-coupled electron transfer drives the proton pump of cytochrome *c* oxidase, Nature 440 (2006) 829–832.
[7] M.I. Verkhovsky, A. Jasaitis, M. Wikström, Ultrafast haem–haem electron transfer in cytochrome *c* oxidase, Biochim. Biophys. Acta 1506 (2001) 143–146.
[8] A. Jasaitis, M.P. Johansson, M. Wikström, M.H. Vos, M.I. Verkhovsky, Nanosecond electron tunneling between the hemes in cytochrome bo_3, Proc. Natl. Acad. Sci. U. S. A. 104 (2007) 20811–20814.
[9] M.L. Verkhovskaya, N. Belevich, L. Euro, M. Wikström, M.I. Verkhovsky, Real time electron transfer in Complex I, Proc. Natl. Acad. Sci. U. S. A. 105 (2008) 3763–3767.
[10] I. Belevich, M.I. Verkhovsky, Molecular mechanism of proton translocation by cytochrome *c* oxidase, Antioxid. Redox Signal. 10 (2008) 1–29.
[11] V.B. Borisov, R. Murali, M.L. Verkhovskaya, D.A. Bloch, H. Han, R.B. Gennis, M.I. Verkhovsky, Aerobic respiratory chain of *Escherichia coli* is not allowed to work in fully uncoupled mode, Proc. Natl. Acad. Sci. U. S. A. 108 (2011) 17320–17324.

Mårten Wikström